

THE SOCIETY FOR THE ADVANCEMENT
OF
JOURNAL
MANAGEMENT



Worthwhile Work
Psychological Aspects of Scientific Management
"Dead Time" in Inventory in Process
Customer Research
Industrial Engineer in Merchandising
A Challenge to Management

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Comment

ABILITY to measure and to use measurements is today essential to management science. The point has no longer to be argued.

This ability is, of course, not exercised without knowledge of the refinements in measuring methods nor without the display of exceptional judgment in applying conclusions to the specific case.

But belief in measurement can readily become too simple and complete a faith. Believers in the inclusive value of measurement need occasionally to be cautioned regarding their disposition to believe that every problem can be solved by being "measured" in this quantitative sense. Too frequently today one sees an exaggerated faith in numbers,—a faith well expressed by Lord Kelvin in the following sentences.

"When you can measure what you are speaking about, and can express it in numbers, you know something about it, and when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind. It may be the beginning of knowledge, but you have scarcely in your thought advanced to the stage of science."

Nothing here said should be construed as belittling the value of and necessity for using measurement to the limit of its possible applications. But on the other hand, let no manager take Lord Kelvin too literally and forget that every executive is by way of facing many crucial issues which have to do with the "imponderables,"—that is, the *unmeasurable* elements in his work.

Should we initiate employee representation? Should we deal with the labor union which is seeking recognition? Should we pay the rank and file for vacations? Should we experiment with profit sharing or employee stock ownership? Should we initiate a particular incentive payment plan?

Here are but a few of the questions—and in one department of the management field only—which are not answered from a slide rule. They are questions of a different essence, related to matters of group power, of morals, of business and social expediency, in a word, related to one's philosophy. This is not to say that evidence regarding them cannot or should not be collected. The experience of others may be immensely illuminating. Parallel and analogous experiments can be studied. Indeed, progress in these fields takes place by the acceptance and extension of successful experiment.

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But it does not take place by measurement. And training in measurement, preoccupation with measurement, blind faith that the slide rule can rule policy—these are definitely partial in their value. A certain type of mind in practitioner and student alike should therefore be reminded of the limits which are soon reached as to the use of numbers. And be reminded also of the necessity for having a point of view and a general background of knowledge about the imponderable factors.

There is reason to think that management education has in the past suffered from this quantitative emphasis. On the other hand it is clearly true that the executive and supervisory training of corporations today is increasingly placing major emphasis upon matters of attitude and behavior and paying only secondary attention to the measuring techniques.

The real skill, of course, consists in deciding quickly which problems are which,—in measuring skilfully where measure avails and in deliberating wisely about policy where appraisal of alternatives is in order.

This skill derives from experience plus the saving grace of common sense. But it can be a saving skill only if it enables the executive to attack his problems with the right attitude and with sound mental tools.

For once it is realized that a given problem must be reflected upon—inductively and deductively—in terms of factors not purely numerical, the way is open to an increased use of methods of sound logical reflection on the one hand and to a realization on the other of the need for some business and social philosophy to aid in guiding one's decisions. And by philosophy is meant a consistent, defensible way of viewing issues in management which require decision about the imponderables.

What we desire, what we believe right, what we should strive for, how relations among men should be translated into business policy—all these are matters upon which a philosophy has sooner or later to emerge. Otherwise we rationalize or justify what we desire; we deem right what is customary; and we fall into the habit of striving for what we see others strive for. And that way lies confusion and error in reaching management judgments.

The truth that what may be a justifiable management philosophy—or attitude consistent with all the facts—is today not completely clear or universally accepted, does not lessen the responsibility which each

one has for trying to arrive at his own self-consistent point of view.

Indeed, these columns could serve no more important purpose than to be open to expressions from our members of what they believe a sound management philosophy is, and why. The question is before the house for discussion. And the only thing which will be measured, perforce, is the length of the contribution!

IT IS a pity that all our members might not have seen the enthusiasm and felt the vigor of the Eastern Regional Convention held under the auspices of the Philadelphia Chapter on April 23, 24 and 25. It was a splendid occasion in every way and the Philadelphia Chapter is to be congratulated upon it.

If any tangible proof is needed that our Society is at last mobilized and marching forward, it was supplied by these well-attended sessions with their total enrollment of over six hundred people.

The program properly reflected the concern of the Philadelphia group over operating techniques which in the production and distribution fields are creating new problems of application and interpretation upon which many are earnestly seeking guidance. The time has fortunately passed when problems of time and motion study procedure, for example, are considered in sessions like these apart from questions of the relations to them of supervisors and employees.

One phase of this relationship, however, received perhaps less attention than our Society—speaking nationally—should properly give to it. The emphasis in these sessions was primarily on ways of saving labor costs. To some extent this involves displacement of workers or replacement of workers by machines.

Savings in cost are a vital concern within the individual company. Indeed society as a whole should ultimately be the gainer by such savings.

But by common consent this is not the management engineer's sole concern. There is a wider calculus in which figuring has to be done, to be truly adequate. Other questions urgently obtrude.

What, for example, are we as good managers to say about ways and means of putting more workers to work in the national economy, about eliminating involuntary idleness and about increasing the per capita production and consumption of goods and services?

Worthwhile Work¹

The Works Program of the Works Progress Administration

By PERRY A. FELLOWS

Assistant Chief Engineer of the Works Progress Administration, Washington

NOW that the Works Progress Administration is approaching the close of its first period of operation and a bill to extend its program is being considered by the Congress, it is desirable that we should pause to take a broad view of our problems. Mr. Hopkins, in a recent message to the State Administrators, outlining the possible extension of the work program into the next fiscal year, has pointed out the importance of making full use of the experience already gained. That experience of course includes everything concerned with the actual work of putting materials together to form a completed project; but that is not all. Our experience also includes some psychological and emotional matters which may be of the greatest importance to us in determining what works projects are most worth-while in the present and future Federal works program. I am not referring so much to the way we ourselves think and feel about these projects, as the way other people think and feel about them. Although courses in psychology and public opinion have not been a regular part of our formal schooling as engineers, we have been obliged to learn something of these matters in the school of experience. What can be done in our government works program depends to a very great extent upon what people feel *should* be done. We find that we have to be practical psychologists and empirical interpreters of public opinion. We must not only do our work well by our own standards, but we must continually run the gauntlet of public criticism. Nor am I referring merely to partisan political criticism, which has its high tide in a cam-

SUMMARY

Federal works projects cannot be fairly judged by the rules applying to enterprise for private profit, as they arise from a motive alien to the traditional thinking of individual business men.

What commercial enterprise is not able to do for private profit will be done for the public benefit by some kind of public agency, if it is really necessary that the work be done.

It is becoming recognized that work may be eminently worth-while in which immediate efficiency according to profit standards may be rightly given up in return for the larger benefits of a long-term social efficiency.

paign year. What I have in mind is something which has at all times to be taken into account in the execution of a government works program, and something upon which our success will ultimately depend—the slowly changing American ideal of worth-while work.

What the American notion of worth-while work has tended to be for a good many years is perhaps best shown by contrast with some other ideas which have prevailed in previous ages of our human history. We may suppose that in ancient Egypt no question was

raised as to the worth-whileness of the project of King Cheops for building the great pyramid on earth as an eternal resting-place for himself. The ideas and feelings of the ancient Egyptians are so alien to our own that we cannot be sure that we understand them. Much nearer to our sympathies are certain projects which the ancient Greeks considered eminently worth-while—the adornment of the Acropolis of Athens with temples and sculpture which represented not only the finest achievements of Greek art but the religious and patriotic ideals of a people who were proud of their freedom. Again, in the Middle Ages we find great cathedrals built, as the builders expressed it, "To the glory of God." When we come down to our own American history, we find that some at least of these motives have actuated many people as a force behind their achievements. Scientists, artists, religious workers, soldiers and sailors, have found worth-while work to do in serving causes greater than themselves, greater than their own personal comfort or profit. But to a very large extent in America,

¹ Address at a meeting of the Washington Chapter of The Society for the Advancement of Management, May 4, 1936.

as throughout the modern world generally, the motive behind work has been the profit motive—the individual's desire to achieve economic advantage and security for himself and his own children.

Up to this decade the profit motive for work in America had so perfected the means for producing the goods and comforts which we all cherish that it was not strange if many people forgot the existence of any other significant motive for human endeavor; and within its own realm of operations, the profit motive has set up standards of achievement so logical and widely accepted that it is all too easy to make the mistake of attempting to apply such standards where they cannot rightly be applied. That is one of the difficulties which we face not only in the execution of our Federal works program, but in the very formation of it. We are from first to last judged by many people having the point of view to which the profit ideal is the supreme criterion. These critics are not necessarily any more selfish than any of the rest of us; they may be, personally, generous and philanthropic, but they have not conceived of the Federal works program as being a kind of large social-economic endeavor to which their familiar profit standards cannot at all points be correctly applied.

The word "efficiency" is a term in which many familiar profit standards are customarily summed up. It is supposed to connote the best way of doing things. Actually it may mean only the best way of doing things for a private profit. Instances can be found without searching very hard in which a private profit involves a public loss. Social bookkeeping includes items on its balance sheet which do not appear in private ledgers. The matter of slum clearances and Federally subsidized housing may be mentioned. It may seem inefficient that the Federal government should put money into house-building which cannot be got back in rents within a reasonable time as calculated from the ordinary profit point of view. If, however, we take into account the taxpayers' money that is spent in giving fire-department service to firetraps, if we attempt to count up the cost to society of disease-breeding slum conditions, if we set down on our balance sheet any due part of the cost of protection against tuberculosis and other diseases, to say nothing of the despair of those who succumb; the cost of our police, our criminal courts, and our prisons, then we find that it is socially inefficient in the highest degree to maintain our slums, and that it is efficient to replace them through a Federally subsidized housing program.

This is a familiar example, and represents one aspect of the situation with regard to which there are already signs of a changing ideal in America as to what constitutes worth-while work. It is becoming recognized that work may be eminently worth-while in which immediate efficiency according to profit standards may be rightly given up in return for the larger benefits of a long-term social efficiency. If this newer understanding did not exist as widely as it does, we should have had more difficulty than we have actually experienced in carrying out our works program. But this newer understanding is far from being widespread enough to give us anything like full public co-operation in our undertakings. We do things differently from the way they are done in private business, and many business men who wish to be helpful nevertheless feel that our way is all wrong.

The Works Progress Administration's mode of operation reverses private contract procedure, as between project and personnel. This is often misunderstood, for our efficiency does not consist merely of getting work done at the least possible cost. Here are a definite number of distressed people in each community. Each can do only certain kinds of work. These specific people must be put to useful work, so projects must be proposed by local officials which fit the work-ability of the people, rather than the traditional place of selecting a project first and hiring the necessary labor to accomplish it.

This is a serious limitation from the standpoint of traditional thinking on this question, but the basic purpose is to put relief people to work. Construction of public facilities must be secondary. Yet despite the speed with which this vast program got under way and the lack of comprehensive advance planning, local communities are bettering themselves tremendously. There are, of course, enough important tasks in our country to use the energies of every one of our unemployed. Thus far we may not always have had those tasks ready when the need for work arose. In an amazing number of cases we have.

Before I go on to speak of some less familiar conflicts of the profit motive with our Federal works program, I should like to mention one example in which it seems to me that the idea of "efficiency" has been misapplied so ineptly that it no longer has any meaning at all. I refer to the road-building situation. The question to be answered is, "What roads shall we improve?" And the answer which many people still give in the name of efficiency is, "Improve the roads that are most used." In effect this means the improvement of main highways,

and the neglect of farm-to-market roads. Our Federal works program takes a different point of view, and concentrates upon farm-to-market roads. It pays the public in a great many ways to get the farmer out of the mud. The farm-to-market road gives an outlet for his produce before it rots or sours; it gives his children a chance to get a better education; it makes it possible to get a doctor or reach the hospital; it makes better citizens, and—automobiles and trucks used more freely, eventually warranting even the traffic count. The historian of the future may find us more pathetic than efficient in the subservient way in which we have followed the tourist's automobile in our road-building, as the road builders of old Boston are said to have followed the path of a wandering calf. The shibboleth of efficiency can, as in this instance, defeat its own proclaimed purpose. Social efficiency may sometimes find that it is not the road the most people travel over, but the road the fewest people travel over, which ought to have money spent on it.

So far I have not spoken of what is one of the most important of all the opinions as to the worth-whileness of our Federal works projects—I mean the opinion of the man who is working on those projects as a WPA employe. It is hard enough to have been forced by circumstances onto the relief rolls. But now that he has work on a Federal project, what kind of work is it? Is it work of which he can be proud?

This is all the more important to him—and to us—because there is absent from such work one element of satisfaction which all of us have been encouraged to demand in America—a wage or salary of which we can boast, or which we can construe as an indication that we are getting on in the world. A security wage can scarcely afford the worker this satisfaction. Nor can his Works Progress Administration job quite give him the assurance of a steady job, which in the past has often been taken for more than it proved to be worth in fact. Things being what they are, his Works Progress Administration job may be considerably steadier than private employment; and he does have a chance to "work up" to a better job. But he cannot say to his wife, "The way my work is appreciated, I think I can keep this job as long as Uncle Sam is in business!" No, this is a queer sort of job, in which ultimate "success" is gained only by leaving it for private employment. It is in that respect unlike any other job that the man is likely to have held. No matter how hard a man may work he is still working at a subsidized job. Both he and his friends have great difficulty in measur-

ing it by any yardstick except the traditional private profit standard. If a man is privately employed in making court-plaster, it will give him some reassurance to hear that his employer is selling lots of court-plaster to Italy and Abyssinia, and making lots of money. But Uncle Sam's business offers no such familiar reassurances, the public motive behind it being much more involved and difficult for the average man to grasp.

In short, many of the familiar emotional satisfactions to which workers have become accustomed in private employment are not to be found in the Federal works program. The emotional satisfaction which it provides, above the level of immediate subsistence and relief from desperate economic anxiety, must be found if at all in the worker's pride in the social importance of the project that he is helping to complete. It must be something of which he can be proud. It must give him the feeling of being identified with something larger than himself, something of more-or-less permanent value to the community or the nation. He can get this feeling in helping to build a new school house, for example, and perhaps his sense of the worth-whileness of that project is kin to that of the builders of the pyramids, the Parthenon, and the cathedrals of the Middle Ages. His work has gone into something that will live on. We all know of particular projects, of the most diverse sorts, which have evoked these feelings in the workers employed upon them. These workers have become so interested in their work that they have come early and left late, they have used their own leisure time in ways which would help the project along; and, unfortunately, we all know of projects—in themselves of civic importance—where everything went wrong and nobody got any satisfactions out of the job at all. Evidently it is not a matter merely of kinds of projects. It is a matter of the way those projects are managed. In the management of these projects, it is evident that more is involved than efficiency of the familiar profit kind. In these Federal works projects there is required a kind of efficiency which, over and above ordinary engineering requirements, can in some way communicate to all the workers a sense of the social dignity and value of their task and evoke in them the pride from which their best efforts will spontaneously flow.

It is perhaps not so much a question of which kinds of Federal works projects are most worth-while—since all of those upon which we intentionally concentrate have unquestionable social usefulness—as it is a question of which projects can be most efficiently demonstrated as worth-while to the public and the workers

We cannot, however, ignore nor expect the public and the workers to ignore, any failure of ours to undertake such work as seems most socially needful and important. Private employers may without question or criticism arbitrarily decide to brighten some obscure corner of our lives with their products, while leaving our chief needs to be taken care of by whom so will; but the Federal works program, if it is to stand on the high plane of social usefulness, cannot but be criticized and questioned if it fails to deal with our largest social needs.

Perhaps the most outstanding of all these large social needs at the present time is shown in our national housing situation. I need not repeat the figures, now well known to us all, which show how far short we are falling in America from our previous normal building operations in the field of domestic housing. We all know that there are grave difficulties in Federal entrance into this field of work, and objections both from vested interests and from organized labor to the most obvious attack upon the problems through the Federal works program; and we know also that at least a beginning which obviates some of these difficulties is now in prospect, through the Wagner housing proposals now before Congress, and this brings us to the largest question of all, one so large that I can only state it here without encroaching upon the field of social-economic prophecy.

The Brookings study of America's capacity to consume has acquainted us with the fact that even during the "prosperity days" of 1929 national consumption should have been 80 per cent higher than it was. A very large number of American families were obliged to live in ramshackle hovels, went underfed and underclothed, had little or no medical care and suffered other privations unnecessary in a civilization with the potential capacity to provide a full life for all. Much of this situation is to be charged against the arbitrary and socially planless operations of our industrial system. A very large field of operation is left for the planned activities of a Federal works program—much larger than is as yet generally contemplated.

In the realm of public works, there is a huge deficiency, as a result of the depression, which might take

more than all our unemployed to make up in several years of planned activity. The realms of erosion control, flood control, afforestation and irrigation, if seriously dealt with in the way that will be necessary to save our country from the fate of Mesopotamia and vast tracts of China, suggest the possibility of a Federal works program stupendous in comparison to the one upon which we are now engaged. We have nearly five and a half million school children not provided with schools or housed in unfit buildings or temporarily and inadequately provided for by double sessions. We are at the present time in need of nearly a million and a half hospital beds. Nearly half of our population is unprovided with public sewerage systems. How efficiently private commercial enterprise can rise to meet these national needs remains to be seen.

There is an attitude on the part of many citizens toward our Federal works program which might be described as one of tolerance. We do things differently from the way to which they are accustomed. We do work out of which nobody makes any profit except the public; and this is tolerantly forgiven us on the understanding that this is a temporary state of affairs during a great emergency. They concede the emergency, but they ask, "When shall we all be back doing business at the old stand?" It seems probable that they will have to adjust themselves to the fact that what commercial enterprise is not able to do for private profit, will be done for the public benefit by some kind of public agency, if it is really necessary that the work be done. The gradual recognition of the necessity for such work, and of the inadequacy of any but a great public agency to its performance, and the final acceptance of the idea of permanency in such public operations will no doubt take some time. The people of America, brought up so largely to judge the worth-whileness of nearly all work from the point of view of the private profits to be derived from it, have been patient with us while we did work from a motive as alien to their traditional thinking as that of the builders of the Pyramids, the Parthenon and the cathedrals of Medieval Europe; and we, on our part, I hope, will be as patient with them while they are learning that this motive of public benefit has come into America to stay.

Some Psychological Aspects of Scientific Management¹

By PAUL STRONG ACHILLES

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BOTH psychology and management may be viewed as practical arts with scientific aspirations. Arts are largely matters of skill and experience, sciences matters of controlled experiment and measurement. Thus it happens that many practices of both psychology and management in dealing with people have developed without benefit of thoroughly scientific experimentation. The scientific method is but a comparatively recent discovery as a tool for sifting the wisdom from the folly in man's vast accumulation of knowledge and behavior patterns. Hence at their worst psychology and management may be partners in crime against human nature, let us hope due only to ignorance, and at their best they may and should be fellow seekers for truth and the common welfare.

It is obvious that scientific management, to attain its objective of eliminating waste in industry must employ exact measurements and that the human element is the least known quantity in its equations.

This points to the need for controlled experiments in industry wherein properly trained and industrially oriented psychologists take part. The situation at present is not one where the psychologist can "tell" the industrialist what to do, nor the industrialist the psychologist, but where both must "learn by doing" and through contributing the benefits of their respective training and experience to better planned and more scientific attacks on the problems of human measurement as involved in industry. There are now hopeful signs of growing recognition of the importance of scientific psychology to management and this is at least the first step toward

SUMMARY

Management must come to realize that human beings are something more than merely a part of the means of production. We cannot yet consider that we have arrived at "exact" measurements of human output because we do not know all of the factors involved both from a physiological and psychological point of view.

Industrialists and psychologists must work together to "learn by doing" how to bring about a more enlightened and scientific approach to the problem of human measurement as applied to industry.

the formulation of specific problems for research. This article is not an attempt to definitely formulate such problems but merely to indicate in a general way a few of the many psychological aspects of scientific management.

If we try to trace the origin of scientific management we find on the one hand, in the latter part of the 19th century, a general trend toward the use of scientific methods, and on the other a great personality in Frederick W. Taylor.

Most movements are given their first impetus by the insight, convictions, and courage of a leader. Their eventual wide acceptance depends in the last analysis upon the applicability of the theories upon which they are based. There is no denying that Taylor's personality gave tremendous initial impetus to scientific management. Copley says of him, "He could make better use of men than they could of themselves. He got out of them what they never expected was in them. He cured them of what has been called 'the habit of inferiority to your full self.' Many a man who had just been humdrumming along in the ranks was started by him on a career in the upper reaches of management. One of his associates in his Midvale days said of him that if a man had only a spark of life, he could fan it into a roaring fire, and that he would have filled up a corpse with enthusiasm if only the corpse could hear."² Perhaps here at the very outset we find a basic psychological postulate for scientific management which Taylor himself did not formulate but made use of unconsciously. It might be phrased in the statement that the full release of human energy requires *faith*, either in one's self, or in a personal leader, or in a cause or plan

¹ An earlier article which made use of the same material around which this contribution is based was published in *The Wharton Review of Finance and Commerce*, January, 1936. The editors have courteously granted the permission for its use here.

² Copley, Frank B., "What Is It That Makes Men Work Hard?" *System*, Vol. 64, No. 3, March 1935.

which makes the demand for expenditure of effort seem worth while. If this be true the first step toward a "scientific" management is to establish and maintain the faith of the workers in it, in its leaders, and in themselves. A review of Taylor's early work with pig-iron handlers reveals this factor of establishing faith although it is generally overlooked.

The principal elements in Taylor's plan were, (1) to utilize only men properly fitted for the work, (2) to instruct them in the best method of doing it as determined by previous careful study of the implements and operations involved, and (3) to offer the incentive of a higher wage for increased output. Taylor *had faith* that under this plan the worker could increase his output and gain a greater reward without any harm to himself. But the same faith should exist in the worker—and Taylor's instructions to "Schmidt," the pig-iron handler upon whom the first plan was tried, apparently sought to impart it. He first took pains to make Schmidt believe in his own capacity. He emphasized the idea that Schmidt was a "high-priced man." Then he told him, "If you are a high-priced man, you will do exactly as this man tells you tomorrow, from morning to night. When he tells you to pick up a pig and walk, you pick it up and walk, and when he tells you to sit down and rest, you sit down. You do that straight through the day. And what's more, no back talk." In other words, Taylor sought to instill in Schmidt not only the idea of making more money but also an unquestioning faith in the wisdom of the plan or the specific instructions he was to follow. Even though Schmidt was supposed to be too stupid to be dealt with in any other way, the error in Taylor's procedure from a psychological standpoint seems to lie in his expectation that a blind, unquestioning faith on the part of any group of workers, even though initially inspired, would endure. Many of Taylor's followers have erred even more flagrantly in this respect. Not only have they overlooked the need for establishing the faith of workers in time and motion study methods and wage-incentive plans but also they have expected them to co-operate when their opinions and feelings in the matter have been completely ignored. This error persists as perhaps the major psychological fault in scientific management today.

There is little to question from a psychological standpoint as to the soundness of Taylor's hypothesis that only workers properly fitted for a job should be utilized. The problem of determining fitness, however, is far from simple. Much of the work of psychologists

in industry has been devoted to it. Most progress has been made in measuring general capacity "intelligence" and certain more specialized abilities, but in addition to discovering the essential *abilities* which a worker should have to perform a given job satisfactorily, the suitability of his *personality traits*, temperament, interests, attitudes, etc., must be considered. The question is often not so much whether a person *can* do a job as whether he *will* do it and find sufficient *satisfaction* in it to stick at it. Too much ability of certain sorts may be just as bad as too little for the happy adjustment of workers to many kinds of jobs, while in others, such as selling, for example, the possession of certain personality traits seems to be of most importance. If scientific management conceives fitness for the job in the too narrow sense of mere machine-like capacity it runs into danger. The human organism differs from a machine in that its feelings, preferences, desires for self-direction, happiness and freedom of choice cannot be disregarded.

Here is the comment of a medical man, "Our science is too formalistic. It aims at the impossible, at treating human beings as pieces of machinery which are in need of repair. We are hampered by the mechanistic tendencies of our age: man is a machine plus 'something.' This 'something' is probably the most important ingredient."³

It must be remembered, too, although perhaps more from a sociological standpoint, that the standards which Taylor set for pig-iron handlers were so high that only about ten men out of a gang of seventy-five could qualify for the work as he prescribed it. Scientific management implies survival of the fittest and insofar as workers attribute to it either their insecurity on the job, or their failure to get jobs, their attitude toward it is not likely to be favorable. As a wise personnel man remarked recently, "We must be *reasonable* about the sort of people we *should* employ and what we may expect from them."

Although the assumption that workers should be suited to their work is sound, the hypothesis that all should perform a given job by exactly the same method is open to question. There is no doubt about the value of seeking a *better way* to do any job and this, rather than the idea of the one and only perfect method, was undoubtedly what the Gilbreths wished to emphasize in originating the now famous phrase, "the one best way." In developing better ways, however, the psychological

³ Sokoloff, B., "The Achievement of Happiness," Simon and Schuster, New York, 1935.

question always to be asked is, "Better for whom?" It is true that many improvements in method are widely applicable and that when workers are given little or no guidance as to how a task may be done effectively, they fall into ways of doing it which may be wasteful of their time and energy. But the assumption that *every* worker will achieve the maximum economy of effort by adopting a single fixed method runs counter to psychological findings as to the nature and extent of individual differences. It also seems to be based on a fallacious abstraction akin to the non-existent "economic man." This appears in the notion that the ideal total method may be built up as a composite of the seemingly "best" ways in which various expert workers do separate parts or elements of the job. These "little best ways" may be far more effective and energy-saving for some workers than others, and, what is more important, where human initiative and individuality are too heavily restricted or unnecessarily crushed the spirit that best releases human energy may die. Again that "something," mentioned by the medical man, must be recognized. Hence, as in the selection of workers, reasonable, rather than too rigid, requirements as to methods of work seem desirable. This by no means denies the importance of discovering and demonstrating to workers how a job may be done more quickly and easily, and insisting, especially in the initial stages of learning, that they form good work habits in sufficient conformity with a standard method to meet reasonable production and safety requirements.

The question of what constitutes skill is naturally related to the instruction and training of workers in prescribed methods. Here also too narrow a concept sometimes appears in the practices of the followers rather than in the ideas of the founders of scientific management. Skill implies something far more than mere automatism or a fixed set of habits, namely, the ability to perceive and correct a faulty adjustment at any moment. As Pear states it, "A surgeon's or an automobile driver's skill implies this. While it consists partly of habits, skill permits immediate interference with any single habit or combination of them. And this makes it difficult to study. Some disputes about skill in industry are unnecessarily acrimonious because these facts are not realized."⁴

The chief point to be made from these facts is that in teaching for skill rather than automatism, more attention should be given to the general orientation of

the worker to the job as a whole and to the "whys" of its parts as well as the "hows." Learning requires a sense of the whole, or the goal to be attained, for effective combination of part activities. The following quotation from Woodworth with regard to pattern forming suggests the need for revision of the perhaps too narrow views of scientific management on the nature and acquisition of skill.

"The higher units in telegraphy and typewriting, the rat's smooth run through a well-learned maze, the sequence of phases in the conditioned response—such patterns are found in all learned activities. In the learning of a performance, the action pattern is at first a mere framework—an orientation toward a goal—but it develops by incorporating parts into this framework. There is first a rather vague adjustment to the situation as a whole, and later, one by one, the various parts of the situation are found and located within the whole. Such phrases as 'fitting parts into a framework,' or as 'grafting parts into an embryonic whole' convey a true picture of the learning process."⁵

And further, Dr. Lillian Gilbreth says that it is "astonishingly true that no two people seem to agree as to what skill is." Her definition is this: "Dexterity, plus knowledge which can adapt itself to changing situations and is capable of improvement."⁶

One of the knottiest and as yet unsatisfactorily solved problems of scientific management is what allowance to make for "fatigue" in setting time standards for a job. This problem is being clarified by distinguishing more carefully between the effects of work, or prolonged exercise, on (1) particular sets of muscles, (2) the general physiological state of the organism as a whole and (3) the psychological state of the organism or feelings of weariness and disinclination to continue work. It has been suggested that the term "fatigue" should be abandoned altogether, since a drop in the output of a worker is always due to the combined action of many factors and not to any single factor which can be labeled "fatigue."

Until more is known about the interrelationship of the many factors affecting a worker's output, there can be little exactitude in "fatigue" allowances. The value of introducing authorized rest periods has been amply proven and accords with the evidence of biological, physiological and psychological investigations as to the importance of maintaining a state of equilibrium or balance in the organism. According to Sokoloff this is

⁴ Pear, T. H., "Skill," *Journal of Personnel Research*, Vol. 5, Pages 480-482, 1927.

⁵ Woodworth, R. S., "Psychology," page 258, Holt and Co., New York, 1934.

⁶ Gilbreth, Lillian M., *Trained Men*, Autumn, 1930.

"a law which forms the A B C of biology, and which is forgotten or rather never fully grasped by the layman. All living matter strives to achieve harmony, and life itself is an urge for harmony and for its preservation and defense. . . . This harmony suffers constant attacks, but every living being, whether a single cell or a man, has the capacity for resisting such attacks and for restoring its equilibrium. That is life. But when the attacking forces win out and deviations from harmony become more pronounced, we have before us the first symptoms of death. This is the basic, immovable, and most important law of biology."⁷

In a number of investigations Mayo has pointed out that this "loss of equilibrium," or organic unbalance, may be due to a wide variety of causes, both external and internal, and that "fatigue" studies must therefore take entirely new directions and procedures.⁸

Probably most criticism of scientific management centers around its practices with regard to wage-incentives. There is no denying the frequent emphasis on speed and greater immediate reward for the worker who attains it, as against the true long-time well-being of the worker. The fundamental difficulty is the lack of any easy or adequate method of measuring human energy expenditure. An increase in *output*, generally reported as an increase in "efficiency," cannot properly be so reported so long as the *input* of human energy remains unmeasured, and such measurements have rarely been made.

On the whole, the structure of scientific management is based on many hypotheses regarding human behavior

which still await proper testing under controlled observation. Meanwhile its practices will probably be modified in the light of opinions and uncontrolled experience. Thus, at a recent meeting of the Institute of Management concerning wage-incentive plans, Mr. Carroll E. French summed up well from a psychological standpoint as follows:

"I would like to emphasize the point that the opposition of the worker is based not so much upon the technical details of the plan, the exact standards set, the exact allowances, the rates, the rest periods involved, the method of computation of his earnings, and the fact that he may earn a bonus under some plans while he is resting at home, as it is upon the perfectly human, understandable fact that he has been ignored in the whole project."⁹

The most hopeful sign on the horizon at present for better acceptance by employees of scientific management and the principles of motion economy is the new approach being emphasized by Mogensen in which the actual participation of the workers in studying motion economy and improving their jobs is gained from the very outset.¹⁰ This approach goes a long way toward correcting the error of ignoring the worker and expecting him to accept constant changes put in by "experts," but in the initiation of which he has had no part. It indicates that where the workers' intelligence and individuality is recognized scientific management makes best headway.

⁹ Uhrbrock, R. S., "A Psychologist Looks at Wage-Incentive Methods," *Institute of Management Series, No. 15*, American Management Association, May 1935, page 29, discussion by Mr. French.

¹⁰ Mogensen, A. H., "How To Set Up a Program for Motion Economy," S-133-148, *Factory Management and Maintenance*, November 1935.

⁷ *op. cit.*, page 169.

⁸ Mayo, E., "The Human Problems of an Industrial Civilization," Macmillan, New York, 1933.

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The Effect of "Dead Time" on Inventory in Process

By RALPH C. DAVIS

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THERE is a certain amount of what may be termed "dead time" that enters into the movement of work-in-process in any type of manufacturing. It includes the time when work is resting in a "bank" of work, or in a storage bay in a department, when it is being moved up to a machine or is flowing between stations on a production line, when it is waiting to get into a machine for processing, and any other time, absorbed by the work in the course of its manufacture, that does not enter directly into the set-up of machines, their operation, or the actual time spent in inspecting the work. The manner in which this dead time affects the inventory and turnover of work in process and the extent of its influence is not always understood as thoroughly as it should be.

In large manufacturing concerns, engaged in continuous manufacturing, the amount of dead time in the movement of work has been reduced, in most instances, to the practicable minimum. Such concerns usually operate a "flow control" of production. In connection with most production control methods of this type, the determination of stores and factory floats is necessary before directly productive activities can be scheduled and co-ordinated satisfactorily. Emphasis is placed on high turnover of work-in-process. One can hardly study the problem of proper factory floats without examining also the problem of dead time. In consequence, the relation of this factor to the turnover of factory float is, for the most part, thoroughly understood. Its reduction to a minimum is one of the reasons for the mechanization of materials handling, the high development of production control, the close correlation of production with demand, and other developments that are characteristic of such concerns.

The concept of factory float is less obvious under conditions of intermittent manufacturing. In many cases, however, it is necessary, under these conditions, to apply an "order control" of production. When one

SUMMARY

Factory float varies inversely with the rate of turnover of work-in-process.

If dead time is isolated from set-up time and process time, and analyzed, it can be reduced to a minimum thereby facilitating a high rate of turnover of inventory-in-process and reducing cost.

attempts to schedule the progress of an order through the operations and departments that are peculiar to its processing, it becomes apparent quickly that the three principal elements of time that must be considered are dead time, set-up time, and process time.

When the factor of dead time

is isolated, some analysis of it soon follows, with a view to reducing it to a minimum. As a consequence, most progressive concerns engaged in this type of manufacturing also have a satisfactory understanding of the relation between dead time and the turnover of work-in-process.

Any manufacturer probably understands the importance of a satisfactory turnover of working capital. However, there are many manufacturers whose management methods are not as highly developed as those in the first two groups. They are found frequently in the field of intermittent manufacture of assembled products. Quite often they do not appear to have analyzed sufficiently the relation of dead time to turnover. The following examination of the economics of this relation, under conditions of intermittent manufacturing, may afford some assistance.

The following symbols will be used to designate the various factors involved:

I_a—Average inventory in process. In the following discussion, it will be expressed in terms of prime cost, for the reason that it is easier to obtain such values from the cost records of most concerns engaged in intermittent manufacturing. Any cost basis could be used inasmuch as cost values appear in the form of ratios.

P—The total production for the period under consideration, expressed in terms of prime cost of orders closed out during the period.

T—The rate of turnover, based on the period under consideration. In most cases, the period probably would be a month.

N—The number of working days in the period under consideration.

F—The average factory float, expressed in terms of working days. Factory float may be defined as inventory-in-process, expressed in terms of time, rather than quantity.

R—The rate of production. In this analysis it is used as the average value per working day, expressed in terms of prime cost, of orders produced during the period under consideration.

X—The average percentage of dead time in the average factory float.

a—Average number of days required for set-up and process time, per order.

b—Average number of days of dead time per order.

General Relation Between Float and Inventory in Process

Float has been defined as the inventory in process, expressed in terms of time, rather than quantity. The average float in working days, under conditions of intermittent manufacturing and an order control of production, would be the average number of days that elapses between the initiation of production and the closure of an order. With continuous manufacturing, an average process inventory of 10,000 units, and a usage of 2,000 units per day, it would require obviously an average time of five days for a given piece to move through its various operations to completion. With intermittent manufacturing, work usually is moved in batches or orders of convenient and economical quantities. However, the same concept applies. The relations between inventory, turnover and float may be expressed as follows:

$$(1) T = P / I_a, \text{ or } I_a = P / T^1$$

$$(2) F = I_a / R, \text{ or } I_a = FR$$

Substituting the relation for average inventory in process, given in equation (1), then;

$$(3) F = P / TR. \text{ But,}$$

$$R = P / N. \text{ Therefore,}$$

(4) $F = N / T$. It is apparent that factory float, as is well known, varies inversely with the rate of turnover of work-in-process. This means investment, because float can be converted easily from terms of time to terms of quantity, expressed in cost value. This is indicated also in expression (2), which shows that inventory increases or decreases directly, with corresponding changes in factory float.

¹ When there are many orders in process at any given time, and the variation in the cost values of orders is not great, then $T = (\text{Total number of orders closed out during period}) / (\text{Average number of orders in process})$. It may also be approximated, using labor or machine hours as the unit.

Capital Released by a Reduction in Dead Time

The reduction of dead time to a minimum depends largely on good production control. It avoids delays through proper performance of the preparation function, assuring that tools, equipment, materials, and other factors in production will be available when they are wanted, where they are wanted, and in the right kind, quality and quantity for proper performance. It minimizes delays by insuring that unforeseen interferences with production are removed promptly. It facilitates the smooth, rapid flow of work through the plant by a proper co-ordination of productive activities. In other ways, its activities tend to reduce the proportion of dead time in factory float. The provision of proper materials handling equipment, and its effective use, also is an important factor. However, its contribution to the reduction of dead time may be reduced greatly when it is not accompanied by good production control. Good plant layout may reduce such time greatly. Good, alert operative management in the shop always is an important factor.

Any reduction in set-up time or process time tends obviously to reduce factory float. Control cannot reduce the time required for set-up and processing, except as it makes possible a greater and more continuous use of equipment through the avoidance or prompt elimination of delays. These elements in float time are affected principally by such functions as time study, tool design, selection of equipment, training, etc. A reduction in the time required for them does not necessarily cause any reduction in the amount of dead time, because the latter depends largely on different basic factors. In the following discussion we are interested chiefly in the influence of dead time on turnover. Therefore, set-up and process time will be lumped together, and treated as a constant time value.

The effect of increasing turnover is, of course, to release capital. Representing the amount of capital released by the symbol "V," then;

(5) $V = I_a' - I_a'' = F_1R - F_2R$, in which I_a' represents the average inventory in process under the original conditions and I_a'' represents the average inventory in process after the amount of dead time has been reduced.

If X is the average percentage of dead time, then the average amount of dead time is,

$$b = FX.$$

The average amount of process and set-up time is,

$$a = F(1 - X), \text{ and}$$

$$F = a + b = FX + F(1 - X)$$

Inasmuch as "a" is a constant, for all practical purposes in connection with our consideration of dead time, then;

$$F_1(1 - X_1) = F_2(1 - X_2), \text{ or}$$

$$(6) F_2 = F_1 \frac{(1 - X_1)}{(1 - X_2)}$$

$$(7) \text{ Let, } (1 - X_1) / (1 - X_2) = d. \text{ Then,}$$

$$(8) F_2 = dF_1, \text{ or } d = F_2 / F_1$$

Substituting expression (8) in expression (5),

$$(9) V = F_1R - dF_1R = F_1R(1 - d)$$

$$(10) = I_a(I - d)$$

From expression (8) it is seen that $d = F_2 / F_1$, and from expression (4) that $F = N / T$. It follows, therefore, that,

$$(11) d = T_1 / T_2$$

Substituting expression (11) in expression (10);

$$(12) V = I_a(1 - T_1 / T_2)$$

It is apparent that the amount of working capital that can be released by a reduction in dead time is determined by the ratio of the rates of turnover before and after the reduction has been effected, and less directly by the ratio of dead time for the two periods. Expression (10) affords a means of evaluating the effect of a given average reduction in dead time.

The amount of capital released is expressed in terms of prime cost. To get the total capital released, the result should be increased by a percentage sufficient to express it in terms of cost-to-sell.

The Value of the Contribution of Increased Turnover

If the capital released can be employed in the business, it should earn whatever is the return that we are getting. To be conservative, however, we shall consider the contribution for profits to be merely simple interest on the released capital.

Let, p —The current rate of interest.

Let, S —The additional profits contributed by the released capital,

$$(13) S = pV$$

The Amount by Which Dead Time Must be Reduced

It may be realized by the management that the amount of work-in-process is too large, and that our turnover is too low. The difficulty may be due largely to an excessive amount of dead time. If current practice indicates that we may reasonably expect a higher turnover, what reduction in the amount of dead time must be made to get this turnover?

From expressions (7) and (11), we see that,

$$d = T_1 / T_2 = (1 - X_1) / (1 - X_2). \text{ Therefore,}$$

$T_1(1 - X_2) = T_2(1 - X_1)$. From which it follows that,

$$(14) X_2 = 1 - T_2 / T_1(1 - X_1), \text{ expressed as a percent of float time.}$$

$$(14a) 1 - (1 - X_1) / d \text{ or } X_2 = 1 - (a / dF_1)$$

The amount by which dead time must be reduced, expressed in actual days of float time, may be determined as follows. From expression (8) it is seen that $d = F_2 / F_1$. From expression (11) it is seen that $d = T_1 / T_2$. Therefore,

$$T_2F_2 = T_1F_1, \text{ or } T_2(a + b_2) = T_1(a + b_1).$$

From which,

$$b_2 = T_1 / T_2(a + b_1) - a, \text{ or}$$

$$(15) b_2 = (T_1 / T_2)F_1 - a$$

$$(15a) = dF_1 - a$$

The facts required for the solution of expressions (14) and (15) can be obtained by analysis of cost and production records, together with knowledge of good practice in the matter of turnover of work in process.

The Use of Analyses of Dead Time

The use of these expressions may be illustrated by the following case example. The particular concern is engaged in the intermittent manufacture of a heavy assembled product. An analysis of its cost and production records discloses the following facts. The average monthly inventory in process, during the preceding six-month period, has been \$44,458.00, in terms of prime cost. The average monthly value of orders completed has been \$15,058.00. The average total float per order has been 69.1 days. For the orders that were checked, the total set up and process time per order, expressed in working days, was 17.7 days. In consequence, the total dead time per order was 51.4 days. The percentage of dead time is 74.5 per cent approximately.

On the basis of this data, using expression (1), the average turnover per month was:

$$T_1 = \frac{15,058}{44,458} \text{ or } 0.34 \text{ turns / mo. or } 4.08 \text{ turns / year.}$$

The management feels that it should get at least six turns per year, and possibly eight, with better production control. This means that a lot of dead time must be eliminated. How much, and what expense will be warranted?

The float ratios for six and eight turns may be determined by the expression $d = T_1 / T_2$

For six turns, $d = 4.08 / 6$ or 0.68

For eight turns, $d = 4.08 / 8$ or 0.51

The amount by which inventory probably can be reduced can be determined by expression (10).

With 6 turns $V = 44,458 (1 - 0.68) = \$14,225$, @ prime cost, or a 32% reduction, approximately.

With 8 turns $V = 44,458 (1 - 0.51) = \$21,730$, @ prime cost, or a 49% reduction approximately.

The average rate of interest is 6 per cent per annum. The above reductions in inventory must be increased by approximately 30 per cent to express them in terms of factory cost. Then, using expression (13),

With 6 turns, $S = 1.3 \times \$0.06 \times \$14,225 = \$1,110$ / year approximately.

With 8 turns, $S = 1.3 \times \$0.06 \times \$21,730 = \$1,695$ / year approximately.

Much of this saving can be credited to good production control. It is, of course, only one of many savings that result from such control.

The percentage to which dead time must be reduced, assuming no reductions in process or set-up time, may be found by expression (14a).

$$\text{With 6 turns, } X_2 = 1 - \frac{(1 - 0.745)}{0.68} \text{ or } 62.5\%$$

$$\text{With 8 turns, } X_2 = 1 - \frac{(1 - 0.745)}{0.51} \text{ or } 50.0\%$$

In terms of days, the dead time must be reduced to the following figures. From the above data it is seen that "a" is 17.7 days. Using expression (15a)

With 6 turns, $b_2 = (0.68 \times 69.1) - 17.7$ or 29.3 days, approximately.

Therefore $F_2 = 47$ days.

With 8 turns, $b_2 = (0.51 \times 69.1) - 17.7$ or 17.5 days, approximately.

Therefore $F_2 = 35.2$ days.

The theoretical maximum turnover is that which would occur when dead time is entirely eliminated. This is impossible, of course. However, it may give some idea of what may be the practical maximum under these conditions of manufacturing. If $X_2 = 0$, then

$$d = (1 - X_1) = (1 - 0.745) \text{ or } 0.255$$

$$\text{Then, } T = \frac{T_1}{d} = \frac{4.08}{0.255} \text{ or } 16 \text{ turns / year.}^2$$

It is probable that the percentage of dead time, under these conditions of manufacturing could not be reduced below 30 per cent. The practicable maximum turnover then would be:

$$d = \frac{(1 - 0.745)}{(1 - 0.300)} = \frac{0.255}{0.700} = 0.3645$$

Using expression (11),

$$T_2 = \frac{4.08}{0.3645} \text{ or } 11.2 \text{ turns per year. Ten turns}$$

per year probably would be very good.

As this case shows, turnover of work in process is limited definitely by set-up and processing time. It also suggests that a helpful development in management might be the more widespread use of monthly work-in-process turnover figures for shop departments. Only part of the job of control is done by the production control department, particularly where there is a decentralized order control of production. Much of the responsibility for the reduction of dead time rests on shop supervision. However, monthly departmental turnover ratios are likely to represent rather vague, intangible values to the average shop executive. In consequence, such ratios are not sufficient in themselves. The average number of days of dead time in factory float is a perfectly definite tangible value that he can appreciate. When the relation of the percentage of dead time to investment in work-in-process is shown, turnover ratios begin to acquire a real meaning for the shop executive, and to furnish a real incentive to keep the work moving. It is physically and mathematically impossible for concerns engaged in intermittent manufacturing, with a decentralized order control of production, to achieve the high turnover ratios of concerns engaged in continuous manufacturing with a centralized flow control of production. They might approach such high turnover more closely if their shop executives were supplied regularly with float figures, including current percentages of dead time.

² The data is for a concern that is working a 5½ day week approximately. With a reduction in the work-week, the maximum possible turnover of work in process would be reduced also.

Some Experiments In Customer Research¹

By ROBERT F. ELDER

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IN A primitive society producer and consumer find little trouble in harmonizing their activities. The fact that contacts are direct and that goods are generally produced to the customer's order, or are so scarce that the customer is glad to take what he can get, makes unnecessary much of what we are beginning to consider one of the essential foundations of modern industry.

In the United States today, the length of the manufacturing cycle plus the complexity of the marketing process complicates the business of serving customers intelligently. The producer in most industries must commit himself as to what and how much he is to offer for sale long before the time when consumers pass judgment on his wares in the market place. Furthermore, in most cases he is insulated from their reactions by the fact that his goods pass through the hands of middlemen who are not particularly good at passing on what they learn about consumers' wants. By the time the verdict of the cash register has made itself felt it is usually too late to retrieve losses or to capitalize on unexpected possibilities. Consumer wants and buying habits change too fast for information six months or a year late to do much good.

The first serious and articulate recognition of the need for harmonizing production and consumer wants dates back to the early 1920's. Perhaps it was because of the complexity of the problem of finding out what consumers really wanted that led to a general attempt to manipulate demand so that it should synchronize with production. It became for a time a popular concept of management that the product should be standardized, a process developed for making it cheaply in large volume, and sufficient sales pressure be put behind it to force the necessary volume on the market. This theory regarded the product as an incident of the

SUMMARY

Determining the wants of consumers and logical markets for their products are problems which manufacturers are having to study increasingly as the structure of our society grows more complicated.

There is as yet no science of customer research but there have been and are being made many experiments which indicate an awareness to these problems by business men.

process, rather than as the end to which the entire process was designed. It is perhaps unfortunate that it worked for a few years, long enough to create an improper mental attitude and to delay a sound attack upon the real problem. Only with the "profitless prosperity" of 1927 and 1928 and with the great depression has the importance of adapting the kind and quantity of goods produced to the require-

ments of the consuming public begun to receive worthwhile attention.

Today practically every business man gives at least lip service to the maxim that "The Consumer is King." The trouble is that few indeed even today know how to go about building this attitude into their fundamental manufacturing and sales policies.

The job is difficult. The consumer, unfortunately, is an inarticulate creature. His criticism of the goods put before him, and the way they are offered to him, is passive, not active. He has become accustomed to casting his votes by purchasing or by refraining from purchasing. If you ask him directly what he is going to want six months from now, he usually cannot even hazard an opinion. If he does answer your question, there is no certainty that he will not change his mind when it comes time for him to spend his money.

Yet modern business cannot exist without planning, and plans, to be valid, must be based on a picture of what future customers are going to want. How can we handle this seeming paradox?

One alternative is, of course, to regiment both producers and consumers by setting up a super-planning body, on the pattern of the Soviet Union, to decide what is to be made and sold, and how much of each kind of goods and services. This avoids the hazards of merchandising mistakes, which now take a tremendous toll from our resources. It is my opinion that this plan will never work in the United States, not because business

¹ Paper presented at the annual meeting of Federated Management Societies, New York, December 6, 1935.

men will object, but because our consumers will never stand for the loss of the freedom of choice which they now enjoy in spending their money.

The other alternative is for producers, individually or in groups, to find a way to study consumers scientifically so that they can forecast the trends of demand. This is not a simple problem. It requires all the tools of modern psychology and statistical methodology, plus a few tools which have not yet been forged.

Significant progress is being made in many quarters. The technique used by General Motors in helping consumers to become articulate is an outstanding example. Techniques for pre-testing products and selling and advertising methods are rapidly being developed. Several concerns are using with considerable success what can best be called consumer juries. A candy manufacturer sought a better place in a highly competitive field by developing a more satisfactory assortment in his dollar-a-pound chocolates. He picked a jury of several hundred people, a carefully selected cross-section of consumers of candy in this price range. To each he sent at about three-day intervals samples of various pieces being considered for inclusion in the assortment. Each member of the jury was asked to rate each piece on a simple scale. The results were tabulated and a tentative assortment built. To determine whether there was proper balance among the various pieces, complete pound boxes were then sent out for criticism. Such factors as size and number of pieces were carefully tested. Finally the product was launched, with highly satisfactory results.

Study of the consumer is also being used as a means of developing marketing plans, even where no changes in products are contemplated. If a manufacturer or merchant has several lines of goods for sale, he must solve the question of what lines can be pushed most profitably, and where, and when. The idea of selective selling has been pretty generally accepted, but what has yet to be widely realized is that it involves more than the matter of selecting customers of profitable size and territories where large potential markets exist. For example, consider the situation of an electric utility company serving a wide area and anxious to build up its load by the sale of appliances. Old-fashioned marketing tactics, attacking with equal force all along the front, were selling goods, but at an expense rate which resulted in the loss of hundreds of thousands of dollars each year. Although this loss from appliance marketing was being made up by revenue from the current used, it was decided that the marketing of appliances should be made to stand on its own feet.

On attacking the problem it was found that there was little authentic information about the current consumption under average home conditions of various electrical appliances. A representative sample of homes was selected. Arrangements were made to meter the current consumed by each appliance under conditions of actual home operation. By determining accurately the load-building effect of each appliance, one step in a plan of selective selling was accomplished.

But to push those items which yielded the greatest revenue would not work unless consumers were ready and willing to buy them. In dealing with consumers the best results are usually obtained by following the line of least resistance. It was necessary to know who were the people who were the easiest prospects for electric ranges, for refrigerators, for washing machines, and so on. Taking representative samples of rural, suburban, and urban families, an inventory was taken of their ownership of electrical appliances. As might have been expected, significant differences were found. The study was really broader than a mere inventory of equipment, for it studied the way in which these people heated their houses, cooked, refrigerated their perishable food-stuffs, cared for the family laundry, etc. It picked up also their comments on the methods they were using. It asked whether they would change their methods if they could, and if so, what changes they would make. It investigated the age and condition of the equipment in use.

It was in the tabulation that the principal value of the data came out. There were disclosed significant differences in the home equipment and methods in families from different economic strata. While these were only to be expected, their precise nature afforded several surprises. Many types of cross-tabulation were used to yield an intimate picture of various segments of the market. It was found that people had of their own accord been buying some items which had not been aggressively pushed; that the heavy advertising of others had not resulted in their general acceptance. It was found that homes of one sort offered an excellent market for one type of appliance, that in another class of homes different items should be pushed. Certain discoveries as to the nature of the market pointed rather clearly to desirable changes in the organization and management of the sales force.

To participate in a few of these consumer investigations makes one acutely conscious of the truth of the old bromide that "markets are people, not places." Only as we understand the people who make up our markets,

know how they live, how they react to various influences, can we build truly sound marketing plans.

The study of people, however, is not a simple thing. It cannot be done simply by sending out a batch of hastily conceived questionnaires and making a few simple and direct tabulations of the replies. The people we question cannot explain themselves to us. We must read them. This means carefully conceived questions, carefully asked. It means interpretation of the answers in the light of the respondents' backgrounds. It means, to a considerable extent, reading between the lines. We must make our questions such that they will get objective answers, and then we must draw from the combination of objective answers the subjective reactions which furnish dominant motives.

In this field of consumer research the tendency is to get away from the large sample, the mass of data. It is not that large samples are not desirable, but that they do not lend themselves to the fine classifications and cross-comparisons which are possible with the small sample. If we are to use small samples, we must of course be extremely careful that they are fully representative. The errors in field work must be reduced to an absolute minimum. Extremely careful preparation and rigorous supervision are essential. If we are sufficiently careful so that we need not expand our samples, to average out field errors, then we can keep them down to the point where the laws of probability permit the safe drawing of deductions from our data. In most of this work, fortunately, what is sought is qualitative, not precisely quantitative accuracy. In other words, it may not be significant whether the proportion of those who favor electrical refrigeration to other types is 70 per cent, 80 per cent or 90 per cent. The thing which is significant is that a preponderant majority feels that way.

At last week's meeting of the American Marketing Society, Professor Borden of the Harvard Business School raised the question of what constitutes an adequate sample in consumer research work. For the manufacturer who seeks to study the market afforded by the entire United States, to obtain a sample large enough by conventional standards may involve prohibitive expense. Professor Borden stressed the need, which many have felt, for some new statistical techniques which would permit use of samples which are commercially feasible within the limits of the average research budget. Such techniques are urgently needed. It might be suggested as a possible line of attack that emphasis be placed on whether the data obtained from

the various subdivisions of the sample fall into a consistent pattern. For instance, if we are trying to determine the ownership of electric refrigerators in homes of various income levels, and get the following results:

In Class A homes—75% have electric refrigerators,
In Class B homes—50% have electric refrigerators,
In Class C homes—15% have electric refrigerators,
In Class D homes—2% have electric refrigerators,
even though the standard deviation as computed may be high, the fact that the four categories fall into a logical relationship each with the other should afford proof of a greater degree of accuracy than could be imputed to each individual figure standing by itself. In this field lies a nice problem for the mathematical statistician.

There is as yet no science of consumer research. The field is full of experimenters who are trying different techniques, driving the first stakes in an unexplored wilderness. The hopeful thing is that so many experiments are being undertaken. It indicates that American business men are awake to the problem, realize the necessity of learning as much as possible about the consumer, that much-forgotten man who in the last analysis is responsible for the existence of our entire business structure.

To Members in Executive Positions:

If you have any openings in your own organization, or if you know of jobs in other firms, of the kind that can be filled by members of this Society, please give us an opportunity to help you fill them from among our membership.

A number of engineers and executives of proved accomplishment have found these past few years to be a lean period and are looking for suitable positions in the fields of manufacturing, personnel, marketing, accounting and administration in general.

Many of our younger members are ready and willing to take jobs as time study engineers, methods men, junior executives, research workers, and in fact, any position in management which will give them an opportunity to grow.

There are a hundred student members graduating from colleges this June. We are hopeful that leaders in management will feel some obligation to give these young men a chance and will realize also that some splendid potential executive skill is available. A number of these students have shown unusual ability and

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Field of the Industrial Engineer in Merchandising¹

By GEORGE W. STIDSTONE

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THE pity of this state of business demoralization we're in is that there is a solution within the grasp of business men. And it can be phrased in two words, *merchandising aptitude*. Those who have it are making money. Those who have not are losing money.

Merchandising aptitude can come *only* through careful study and thought, the establishment of a definite program of acquiring a knowledge of consumer needs and wants, and the constant use of this knowledge to perfect merchandising and distribution plans,—in short, to know the market *today, tomorrow, and the day after*.

This crisis, known as the "Economic Depression," has produced fear in our leaders of industry, temporarily paralyzing the dynamic and inherent trail-blazing and go-getting qualities of our pioneer business men. The youth of our land are facing at the present an abject condition of industry with an attendant lack of opportunity and an apparent failure to measure up to the past elasticity of American democratic life.

Social and industrial conditions offer many rewards for the ingenious and imaginative leader and individualist, but no part of hesitancy nor of doubt of the future can be permitted in contemplating the course to be followed.

As never before, our country and our businesses need the men who are not afraid to try, who are not afraid to fail, while trying.

Until the beginning of this century the demand for the products of our factories was ahead of the supply.

Into this situation there came those industrial engineers, Taylor, Emerson, Gantt and others, whose brilliant minds and great abilities produced a balance be-

SUMMARY

The principles discovered by the students of industrial engineering in the field of production have been applied to merchandising with considerable success but much remains to be done.

The emergence from the depression will be quickened as people hasten to purchase luxuries and other goods from which they have been abstaining and this will be taken advantage of by the seller who has mastered the techniques of determining markets.

The industrial engineer and the marketing counselor will find a vast field in which to practice and a number of the problems involved are here posed.

tween manufacturing supply and demand and laid the foundation for the continuance of the calling of industrial engineering. Surely these men and their eminent successors have laid down a foundation of research and development which should in nowise be limited to the narrow confines of plant production and manufacturing operation.

So far as I have been able to learn, the fundamental principles of industrial engineering may be summed up in five points as follows:

1. Planning buildings, machines, manufacturing operations and business activities, rather than permitting haphazard growth.
2. Through planning and analysis, determining what can and should be accomplished.
3. Delineating and budgeting the goal or task desirable and possible of attainment.
4. Designing and developing the means or methods of accomplishment.
5. Introducing, inaugurating and installing the procedures or methods designed and developed, and *making them work*.

It may be said, that these five points of industrial management constitute the basic outline of merchandising management which may be concisely stated as follows:

1. Developing and planning product.
2. Determining basis of distribution.
3. Budgeting sales and costs.
4. Determining practical means of accomplishment.
5. Installing, following up, and managing.

In a sense, therefore, there is nothing fundamentally new in the science of management as applied to merchandising.

Our recent experience in merchandising has taught

¹ Paper presented at a meeting of the Boston Management Council, Boston, November 21, 1935.

us that the consumer of our products is a fickle person. Not only does he demand goods, but the capriciousness of his wants forces the producer to perform functions otherwise not necessary. These entail the supplying of merchandising mechanisms varying in complexity with the whimsicalities of our people.

The competitive system under which we now operate makes necessary the function of selling the consumer and not merely permitting him to buy. Competition governs the movements of substantially all of our products, and makes it mandatory that *co-ordinated* production and marketing shall not be inactive in creating a demand for goods to be sold.

The progress which we generally recognize as a necessity of civilization demands continued education, stimulation and enlightenment on the part of the sellers. In addition, man's desire for more goods which increase his respect for himself and others, increases his own individual productive efforts so that he may have the means whereby his wants may be satisfied. Merchandising activity, which serves to educate the consumer, makes possible more intelligent decisions as to what and when to buy.

With decreased incomes, the buying habits of the consumer reverted to a confinement of purchasing intended to satisfy physical requirements only. Necessity for a conservation of whatever resources were left, left their indelible imprints on human consciousness, but the desire and urge for more goods can be easily re-awakened and cultivated with the return of hope that prosperity is to be an actuality and not a meaningless word.

There will be a ready market and opportunities for aggressive selling and the results of the new vision of merchandising will help to restore and raise still higher the standards of living.

Every seller of the future must have the knowledge necessary to judge of the prevailing and prospective buying habits and desires or he will not survive.

The salvaging processes of commerce, and of restoring the morale of people, are linked together as one common problem. Its solution will not be determined simply by right doing or by high ideals. These are, of course, necessary, but beyond these we must acquire the knowledge of how to interest people, how to arouse their hopes and expectations, how to build up responsiveness, how to lead, how to adjust, and how to control.

Desire for comfort and recreation, pride, ambition, emulation, initiative, self-esteem and love; these and

other motives testify to the existence of a highly developed emotional sense in human beings. Apart from these, there are more conservative or practical motives which actuate habits such as economy, dependability and convenience. Still further in the development, we find motives which primarily do not arouse particular desire for an article, but which do influence the consumer to buy in a specific locality or for a special reason. Thus we have the conditions of price, variety, reputation, services, convenience of location, or belief in a particular type of distribution.

By virtue of education, training and actual experience in simplification of manufacturing processes, the industrial engineer has first-hand knowledge of the products being turned out for man's necessity and comfort. Too often, however, his viewpoint of product acceptability has been tempered by his knowledge of the necessity for cost reduction, which has caused him to overlook the fact that consumer appeal is one of the first principles of a successful marketing plan. Probably, however, he has not been consulted or permitted to inquire into this phase of product movement. This should not cause him to forget that his bumps of curiosity are still with him, and that he should acquire knowledge as to where his product is going.

The successful industrial engineer of the new era in merchandising must be constantly thinking in terms of new products. Goods and commodities are being revolutionized in their fabrication processes or in the manner of marketing presentation and appeal. New and startling ways of packaging are focusing rapt attention upon nonentities of necessity. New uses for old products; new products for old uses—change, change, change.

When people get into line again in the feverish desire to buy, they will be looking mostly for the products which are new in general appearance, style, or in "eye appeal," and which have some relationship to luxuries. Necessities will have to be "dressed up" to avoid the appearance of necessities, because five years of necessity buying will carry a feeling of resentment against those products with which they have had to be content during this last half decade.

The art and technique of true analysis has always been one of the essential working tools of an industrial engineer. Merchandising endeavor of the immediate past has required analysis of its various functions to an extent never before appreciated in management direction, but in contrast to much of the previous work, future analysis will have to result in more potent facts

and less meaningless and futile information. In one of our recent investigations we were forced ruefully to conclude that here was a plethora of information but a paucity of facts.

Take for instance the problem of sales analysis. With all of the effort which has been concentrated on this most vital type of information, one would expect to find fairly well defined reasons for sales increases or decreases. And yet, facts are missing.

Are sales falling off: First, through lack of appeal? Second, through quality decadence? Third, through inability to compete with price? Fourth, through poor and ineffectual representation? Fifth, through general obsolescence?

Future merchandising mechanisms must answer these and other questions. Those closest to the problem are often unable to develop the means for determining these mechanisms, and hence the clear and fresh viewpoint of the industrial engineer must be supplied.

We must know our merchandising facts, first, last and always, if we are to merchandise at a profit.

To obtain these facts requires market analysis which demands that investigators completely divorce their minds from the traditions of the industry and think in terms of the consumer. This is extremely difficult because the most common inherent characteristic of man is his objection to change.

The first step in market analysis is to consider product characteristics, both as to the product itself, and its packaging. For example, the packaging of foodstuffs offers real opportunities for improvement in terms of consumer acceptability. Canned goods of almost all types and kinds are packed in No. 1, No. 2, No. 2½, and No. 3 cans. A vegetable packed in a No. 2 can may serve four people adequately, while a rich fruit in the same sized can will serve six people. The size of cans and other packages seems to have been developed with little consideration for various sizes of servings. No product can be packaged in terms of the *average-sized* family only. Why should not the various products be packaged so that *various-sized* families can buy a single-meal service which will be ample? Packaging foodstuffs in terms of the several most common numbers in families would be a step toward creating a new value in food products which would possess a marked competitive advantage.

Numerous other characteristics of products and packaging can be discovered about almost any product if market analysis is soundly conducted with an open mind. Adequate market analysis also determines the

number and location of outlets for specific products and enables economic distribution territories to be created for salesmen as well as definite basic data for sales quotas, sales effort characteristics by individual outlets, and other pertinent data.

Seasonableness is another factor which can be definitely determined by market and sales analysis. For instance, a manufacturer of felt hats or straw hats alone is at a disadvantage as compared with a manufacturer of both these products, one of which can be made and sold during its proper season. Market analysis enables manufacturers to choose territories where the depth of market can be served economically, thereby eliminating lean markets requiring abnormal distribution expenses. Only by using correctly balanced combinations of direct sales, wholesaling, agency, and direct-mail sales, can most manufacturers economically cover a very wide area. Many concerns would make far more profit on half their usual volume of sales if they were to restrict their efforts to economic territories.

Market analysis can determine service functions needed by the consumer and eliminate expensive services which give the consumer little real return. In practice this policy has sometimes been reversed by creating expensive service factors and advertising them at heavy cost. In this connection consider the expensive results of vacuum packing of certain foodstuffs as against expensively maintained and promotionalized dated deliveries.

Very few concerns have yet developed a true picture of what their product should be and where and how it should be distributed. Many complain that it is too expensive to obtain this information. One company, however, which had lost several million dollars during a three-year period, corrected this condition by spending less than \$10,000 on market analysis. In the majority of cases companies have, particularly in the sales force, all personnel necessary to carry out market analysis which must be utilized continuously rather than intermittently. The picture of any situation in whole or in part, is likely to change materially in the course of a year. Facts to be of value must be current.

In the development of market analysis we have preferred to use the mechanism known as Continuous Market Analysis. This form enables the direct-sales organization, or the agent and jobber organization to report back periodically to the producer the constantly varying condition of the market. Forms are devised

and printed covering questions, the answers to which are necessary to the sales progress of the company.

Each prospect in a territory is carded by the Sales Department after a careful study of trade lists, rating books, or customers' ledgers. It is easy to obtain information asked for on the form, and our experience indicates that it takes only about 6 per cent of the salesman's time. In fact it is a time saver in that it has reduced unnecessary sales contacts by almost 30 per cent.

With the proper foundation laid two major problems remain. The first is promotional effort, to be carried out principally through advertising in many of its various phases. Much of the data necessary for the establishment of the promotional policy can be determined from market analysis. The remainder will be collected when the actual sales method is established, in order that promotion may be properly geared to the actual sales program.

The other major problem is the establishment of the sales mechanism itself. Under the new merchandising era, the haphazard employment of salesmen to work in casually outlined territories on a personal-control basis, will be unsound and uneconomic. Certainly an excellent sales organization of high-type individuals is essential, but just as true is the fact that they must have proper tools to work with. Selection and training of salesmen, creation of proper sales methods, control of salesmen in using these methods, are all essential to sound results.

The industrial engineer will have an excellent opportunity for developing standards for marketing endeavor to the same extent as he has developed them for manufacturing opportunities. Marketing activities are more intangible than in the field of production, but certain outstanding accomplishments have already been made in measuring sales results through salesmen's compensation and through setting quotas and budgets.

I recently saw a report setting forth the result of analyzing salesmen's call reports and it was amazing to see that relatively little time was spent in actual selling. When questioned as to the time spent on activities other than selling, I was informed that it was all necessary, but I seriously question the necessity for such results as:

1. Correcting mailing lists.....22% of total time
2. Obtaining information at headquarters...14% of total time
3. Answering customers' complaints.....32% of total time
4. Making reports.....17% of total time
5. Studying sales promotion data.....11% of total time

Determining allowable time limits for many of these functions will result in more time for solicitation, which is the fundamental reason for having sales representation.

We must insist more and more upon developing merchandising plans which require less bookkeeping and more selling from our salesmen. I believe that our recent era of merchandising growth has included too much of paper work for the salesman. And I further believe that the industrial engineer, in his greater appreciation of this problem, will devise ways and means of overcoming this condition.

The future era of merchandising should demand a closer working co-operation between the advisory industrial engineer, the sales manager and the controller. They have many activities in common; each can be of immeasurable benefit to the other, and all are, or should be, working for one common end.

In the developing of merchandising and marketing plans for the future, the industrial engineer must seriously consider the spectre of obsolescence and its effect on costs and capital. In developing new products for consumer acceptance, or in catering to the demands of too-dominant distributors, a great risk of capital may be taken, for unless proper study of potentials is made, a too-venturesome program may well result in disaster.

On the other hand, age, usage, idleness and deferred maintenance also help the scrap heap, and the manufacturer with fixed capital not properly turning or compensated for in his price, is decidedly vulnerable. Obsolescence, therefore, is more than a term which engineers and accountants may use to overawe clients. Obsolescence may be a cold reality; it may mean dismantling an entire plant long before the end of its rightful span of useful life if new production processes are being used by competitors of vision and courage who thereby gain larger volumes of business at lower prices, and at a profit.

There will be many problems of future merchandising which must be answered by the management of the future, and the industrial engineers and marketing counselors will be forced to contribute some solutions to these problems. A few years ago, we knew nothing of market measurement, territorial limits, quotas, budgets, salesmen's compensation methods, controlling salesmen's activities, call reports, market analysis, pricing policies, and other similar merchandising mechanisms. And what shall we know of tomorrow's problems until they are met or planned?

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A Challenge to Management¹

By LEON C. STOWELL

President, Dictaphone Corporation, New York

SOME American business men have unthinkingly built up a resistance to management engineering which is really based upon a misunderstanding of the purposes of and needs for such service, and the results which can be obtained. I think you will agree with me that there is abroad in this country a good deal of erroneous thinking about management engineering, which when boiled down to its essence, supports the repugnant idea that the main purpose of expert management is merely to make less people do more work and then discharge the remainder who can be spared because of grinding more work out of the few.

You and I know how diametrically opposite the accurate facts are. I am sure it is true that in the long run only efficient offices can give and maintain employment, yet, whether you are on the planning side or the operative side of management engineering, I think you will agree that there is much unthinking resistance because of such false thinking on the part of some business men in whose hands rests the power to decide whether or not management engineers shall be hired.

How to overcome such resistance is, in my opinion, one of the main problems facing members of The Society for the Advancement of Management, and the remedy I firmly believe is to be found in that educational process which is known as salesmanship.

I think I am safe in making the statement that despite the many years of study and experience required to become an expert management engineer all of his technical knowledge and ability fall far short of their maximum effectiveness until he is given a favorable opportunity to use them. In other words, something

SUMMARY

Management engineers and others interested in the science of management must overcome the resistance to its introduction by good salesmanship.

Some suggestions for the consideration of management engineers in selling their services are:

The notion must be dispelled that there is anything mysterious in management engineering.

Executives must be educated to the acceptance of change.

Preliminary selling should be made to the lower strata of an organization.

Executives frequently are blind to the necessity for scientific management in their offices even when they accept the idea for their factories.

more is required—the knowledge of how to get in and how to get his ideas across.

I admire the engineering profession, and particularly management engineering. I believe in it. But it seems to me that many times management engineers surround their skillful ability with some mystery to make that ability appear exclusive. They make it appear that they, and they alone, possess something of great value to the purchaser. It may be true that individual engineers may possess unique personal ability, but I have never been willing to believe there was any mystery about it. Marked personal ability and experience

are fairly obvious once adequate personal acquaintance-ship has been established.

Why, then, try to give the prospective purchaser of engineering service the feeling that once the contract has been entered into, the mystic veil will be drawn aside and reveal the wonderful system in all its glory?

I believe that to reach the understanding of executives, many of whom have little or no knowledge of the technical phraseology in highly specialized professions, the expression of the purposes and objectives should be put in simplified terms, and I believe this would go far in gaining more prompt and wholehearted acceptance of such ideas.

The problems facing management experts are very similar to those facing the office equipment industry. Although office equipment companies tackle management problems only in so far as they apply to the individual machines or systems which these companies have to sell, I think you will agree that there are some excellent specialized management jobs done by some of these companies. May I say that it has been a real privilege for office equipment organizations to cooperate with management engineers who are doing

¹ Paper presented at a meeting of the New York Chapter of The Society for the Advancement of Management, February 19, 1936.

more comprehensive work simultaneously in the same establishments.

As you know, up to the time that the depression became severe, office equipment and systems were becoming increasingly popular, not entirely for the economies that they assisted in establishing, but because of the conveniences and efficiency of the methods made possible by their use, and because office problems were becoming so increasingly complex and numerous that even the best and most efficient methods were none too good to keep the wheels moving smoothly.

Great credit is due to the groups that you represent for the progress that has been made in scientific management in factories and offices. It can be said, I think, that this progress has proceeded much further in the factories than in offices, and that the same principles and methods which have been found so successful in manufacturing establishments are being adopted in office work in an ever-increasing way, particularly in recent years.

Much to the surprise of many of us in the office equipment industry, when the depression became most acute, we began to find some of our products becoming unpopular among certain American business men. While this new type of resistance was not serious enough to retard noticeably our progress, it furnished a type of sales problem which could not be successfully met by some of the less versatile salesmen.

We were even accused of being responsible for the depression! It was claimed that we produced so much through the medium of our machines and systems that there were no longer positions for a large surplus of office personnel. It was said that less efficient methods should be used so that more people would be employed, that inventive genius should be stopped, that we had gone far enough in the development of new machines and new methods, and it was even recommended that many modern methods should be abandoned.

Apparently those who originated and sponsored such arguments took no pains to get at the facts nor to analyze the situation. Had the people expounding this theory taken the trouble to look up the facts they would have found that census figures of those gainfully employed in clerical occupations were available since 1890. At that time there were 805,000 clerical workers in the United States. They would have found that there was a consistent increase in this class of worker in each ten-year period since, until in 1930, the number of clerical workers totalled over 4,025,000. This was an increase of 400 per cent in forty years, and during that period

the population increase was only 95 per cent—an increase of 400 per cent in clerical workers during the very years in which most of our products were invented, developed and marketed. And yet we have even been told that we were responsible for the depression, and no doubt you have had a similar problem to contend with.

If there were a modicum of truth in the notion that machines displaced workers, our automatic typewriters, adding machines, and dictaphones, filing systems, multigraphing and addressing equipment, tabulating machines and countless other mechanical aids in office work would practically have abolished clerical workers long ago.

On the other hand, it has been said that if the office equipment industry did not hurry up and develop some new methods with which to speed up the ever-growing necessity for office routine and to relieve the increased burdens which are being borne by executives, by the year 2,000 everyone in the United States would be working in offices. This is absurd, of course, but if office workers increased from 805,000 in 1890 to 4,025,000 in 1930, what will the increase be in the next seventy years unless you and I do a lot more about it than we have accomplished to date?

Why, then, was there such loose thinking as to build up an actual resistance in some cases to the purchase of office machinery and systems, and for that matter, to the employment of management engineers and to the adoption of management ideas, which resistance, by the way, seems to me now to be disappearing.

The answer seems obvious to me. Of course, every period of depression naturally brings forth a new crop of critical and economic theorists, and at such times, when large numbers of the people are worried, such false theories find ready acceptance; and thus the resistance grows apace.

We all know that in America of today, our standards of living, and, in fact, our civilization itself, is based upon science and invention, on machines and methods, and it would be impossible to conceive of our world without them. Yet practically all of this development has come within the last fifty years. Children growing up today will have no conception of what the world was, and how business was conducted, without our modern methods and machines.

I feel, therefore, that one of the real responsibilities which faces the management group is to counteract in every possible way by the spoken and the written word

the false ideas and loose thinking which have set up such barriers of resistance.

Another and even stronger resistance which no doubt you encounter in common with ourselves is that which is always present, and probably always will be, namely, the resistance to change of habit, particularly among people who have arrived at positions where they are responsible for the management of business enterprises, and where there is a natural tendency to resist change, particularly if such changes affect those in positions of authority. Certainly the office equipment industry finds as its number one resistance this reluctance to change. It always surprises me to find executives refusing to consider or accept new methods and machines. Yet they can expound for hours on the need of their particular products and the improvements that have been effected in them. This reluctance to change, however, can easily be overcome with patience, backed up by a thorough knowledge of facts, history, and the results to be obtained. This resistance of habit and the problems surrounding it are always interesting in the extreme, and all-important.

The Office Manager has one of the most difficult jobs in business. He is supposed to maintain a highly efficient and economical organization. He is held responsible for its results and yet the very men who give him that responsibility and expect efficient performance hold themselves aloof from organization, making it difficult to change the habits of others around them. It seems to be a badge of office for executives to arrive at work long after the routine of the day has started, and to keep such irregular hours as meet their whim and depart frequently before the office closes.

They exercise their prerogative of sticking to a secretarial system for themselves, much of which can easily be demonstrated as obsolete.

Their secretaries are often without any work to do, or are doing things of inconsequential value when others throughout the organization surrounding them are expected to and do turn in a real day's work every day.

The physical surroundings of executives usually are of the finest and most comfortable variety.

There would not be any particular significance in this demarcation between the efficient methods which are a standard of the office personnel and the obviously inefficient methods with which many executives surround themselves were it not for the fact that there is a serious side to this picture, for many of the young people in this country look to the physical surroundings of executives in their organizations as symbols of success. And all

this, although they do not analyze it, gives them the feeling that if they arrive at that point they are through with efficiency, which means hard work to them. Then they can have what appears to them the obvious freedom, and inefficiency, if you please, of the higher executive. This phase of the atmosphere of offices is, in my opinion, one of the great problems which management engineers have to face. Some of you, perhaps all of you, have been successful in facing it, but I have brought it out here because it is a problem to my mind requiring constant thought and attention, and I have seen many cases where that issue is not faced squarely.

Another problem of scientific management which perhaps is somewhat akin to this one is summed up in the statement that in my opinion, it is much easier to sell an executive on the efficient operation of his manufacturing establishment, which may be located some distance from him physically, than it is to sell him identically the same idea for his office, which is right outside his own door.

I remember being very much amused some years ago to read of the total destruction of a fire house by fire in the middle of the night. The fire companies which were housed in that fire house were very efficient. They had been trained to the routine of leaping to attention at the first alarm, dressing, sliding down the pole, mounting the apparatus and riding out to fight a fire wherever it might be.

That night they awoke at the fire signal, but found to their consternation that their own firehouse was ablaze. The regular routine was impossible. Their regular thinking in regard to fire fighting was of no avail. Here they were in the midst of it and the firehouse was destroyed. I do not think that is so far removed an analogy from what goes on in some American businesses. We presidents can listen attentively to plans and ideas about the efficient operation of our factories. It is regular routine for us to tell our factory people to investigate the scientific study which has been proposed. It is regular routine to demand that economies and efficiencies be practiced in our manufacturing plants, and, in fact, anywhere in our organization removed from our own personal offices. But what happens when a plan is proposed for the more efficient and economical operation of our own office?

That's different! We cannot visualize any change or reorganization which may affect us. We are apt to listen attentively to the comments of our associates around us who explain why the plan will not work and it all sounds convincing—more convincing many times

than the presentation of the engineer or salesman who has brought the plan to us.

There are ways of overcoming that attitude, of course, and it is not at all true that we always find it. But the more that possibility is recognized by those who sell engineering service, the more progress will be made.

You, of course, realize as well as I do that there is a natural resentment to making changes suggested by outsiders. The average executive finds it inconceivable that someone from outside his business can walk in and do something for the particular department of that business through which he rose to his present position. I admit to a failing in that direction myself. I sometimes think that the sellers of management engineering service make the mistake of approaching first the top executive, even though he is the man who must eventually be sold. I base this belief on the resistance which I have seen crystallized in the minds of department heads where the actual engineering work is to be done.

I do not offer any advice on that subject, but it has always struck me that some preliminary work ought to be done on those responsible for the operation of the department or departments in which the engineering is to be applied. If you can get the plant manager or office executive interested in just what your plan will do for him, I believe that you will be on the right track. Operating men, in my opinion, resist being checked up, and many of them feel that management engineers are just check-up men. The accountant is an exception in this regard because he is in the habit of having his work checked by independent accountants. This feeling on the part of operating men has been brought on many times by management engineers themselves. The so-called preliminary survey stirs up much opposition and it certainly is true that a good situation can be made to look terrible by picking on a few details.

Another thing which seems to be unsound is the willingness of many engineering firms to take jobs on a contingent basis. It is my belief that it tends to lower the high standards of the engineering profession. In the first place, I do not think a good engineering job is subject to such accurate measurements when finished that you can arrive at an accurate fee for such efforts. In many instances, the intangible benefits far exceed in value and importance the tangible benefits. Secondly, I cannot conceive of the average executive being willing to engage engineering firms on that basis. I do not know how the contingent fee stands among you—I just want to make clear my own point of view, but I do not think it does credit to the engineering profession.

Salesmen of engineering organizations should not fall into the same trap which salesmen of other organizations do; namely, the trap of dragging in their competitors.

In talking to a group of sales managers recently, I said somewhat jokingly, but nevertheless in a serious vein, that I strongly recommended that a rule be passed in every sales organization to prohibit salesmen from saying anything about their competitors.

One more comment. I believe that the average seller of engineering service attempts to accomplish too much at the first interview. Perhaps it is possible to sell the management engineering idea in one talk, but I certainly do not believe that the average of success in that way is very high. And I think that much more would be accomplished if attempts were not made to cover so much ground immediately. After all, what Management Engineers have to offer is to a certain extent intangible. It is not merchandise which can be seen, handled, and demonstrated. It is service which, until results are produced, must be bought on the belief in the men who offer it and proof of what has been done for others, and it is particularly necessary that both engineer and purchaser develop the mutual confidence which comes from acquaintanceship not possible of attainment usually in one interview.

NATIONAL MANAGEMENT COUNCIL

Report of the Chairman—Third Annual Meeting

By HARRY ARTHUR HOPF

Management Engineer, New York

A little over three years ago, at an informal dinner meeting of a number of leaders of the management movement in America, it was my privilege to deliver an address entitled, "The Management Movement at the Cross Roads." In that address, after dwelling upon the genesis and scope of various associations and societies active in the management field, I gave consideration to the international aspects of the movement. In that connection, I stressed the fact that, whereas the management movement in this country was still in a measure in an individualistic epoch of development, in the world at large that stage of progress had long been succeeded by a co-operative epoch, characterized, in the majority of countries, by organization of their management activities on a national scale.

Finally, I led up to a delineation of what I conceived to be the existing challenge to management in this country; namely, the challenge to synthesis implicit in the history of the development of the American movement. I am sure you will bear with me if I quote a few paragraphs from the concluding section of the address in question, in order that I may set before you the language employed on that occasion in stressing

certain points of view which apparently have not lost significance with the passage of time, but on the contrary may well justify re-emphasis today. These are the paragraphs to which I have reference:

"It is often difficult to discern the motives which promote or inhibit action when the thought of co-operative endeavor is presented. To some it makes a powerful appeal because they are intellectual adventurers, ready to grant a sympathetic hearing to pleas for the support of new projects. To others the appeal is initially less effective because, regardless of its inherent logic, they experience a desire to analyze the 'how' in addition to the 'why' before expressing concurrence. Individuals in both categories need hardly be reminded that in the history of every movement there comes a time when furtherance of its highest interests demands of its adherents that they refrain from continuing to 'hold outworn opinions as against new light.'

"The American management movement has within its grasp the promise of a new era of organized co-operation which, courageously entered, will enable it to take its logical place at the side of other great agencies concerned with finding solutions to the problems besetting the world of today. To what heights its reach may aspire is in the lap of the future, but it must bestir itself if it is to live up to the great traditions it represents; above all, it must realize that there is much lost ground to be recovered. Between the Prague and Amsterdam gatherings of the International Management Congress lay a brief span of eight years; yet to one observer who was privileged to view these two milestones of progress in the international field at close range, it was apparent that American contributions had sunk from a position of undoubted superiority on the former occasion, to a plane of bare equality on the latter.

"To pass from analysis to synthesis, to meet the challenge which faces the management movement of this country, to formulate a practical program that will enlist the whole-hearted support of the constituent associations and societies, are some of the tasks which lie ahead. There can be little doubt that sooner or later these tasks will be performed, or that an agency will be found to which the responsibility for performance may be safely entrusted."

Within a few months after the presentation of this address, the National Management Council assumed organized form, eight of the associations and societies in the management movement having officially determined to make common cause under the aegis of the Council. By the end of 1934 the number of constituent organizations had risen to eleven.

In the two annual reports which it has been my privilege to submit to the Council, I strove to delineate what I regarded as the influences of major consequence pervading its activities, and endeavored to strike a balance between problems of domestic concern and those dealing with aspects of the international sphere. Because of the peculiar relationship created by the fact that the original impetus to international activities emanated from this country, questions dealing with international growth of the management movement must always remain matters of deep interest and intimate concern to us here in America.

And now we stand again at one of those annual milestones at which it is fitting that we consider what has been accom-

plished and endeavor to picture some of the problems and perplexities that may lie ahead. Let me first deal with the accomplishments, and single out for specific mention the more important activities which, by general consent, we may legitimately characterize as coming under the head of results achieved.

With respect to the field of inter-society co-operation, the current season is witnessing an effective demonstration in the form of joint meetings of local groups. As you know, each member-organization took over the sponsorship of one such meeting and made itself responsible for the selection of speakers and discussion leaders. The meetings are being held in the auditorium of the Metal Products Exhibition at 30 Rockefeller Plaza; they are well attended, and lively discussions are the rule. I believe that experience with these meetings justifies the conclusion that they should become a permanent feature of co-operative endeavor in the Metropolitan area. Credit is due Mr. G. W. Kelsey of the American Society of Mechanical Engineers for shouldering a large part of the burden of work leading to the organization of these meetings, which are repeating the success achieved through the use of a similar procedure by the local chapters of management associations and societies in Boston, Mass.

In my report to the Council at its second annual meeting, when discussing the subject of future trends in the field of co-operation, I made the following statement: "I speak from long exploration of the problem when I say that it is my conviction that we have too many organizations in the field, and that the entire movement would profit greatly by certain consolidations whose value is obvious in several directions." In the intervening period of time a consolidation of major importance affecting two of the member-organizations of the Council has taken place. I refer, of course, to the consolidation of The Society of Industrial Engineers and the Taylor Society under the new designation, "The Society for the Advancement of Management." These two organizations have long enjoyed close co-operative relationships, and the bringing together of their respective memberships into one organization, deriving new strength from each of the groups composing it, is a step that augurs well for the future success of the new Society. A beginning has thus been made toward clothing co-operative endeavor in those more enduring and comprehensive forms which all discerning students of the management movement in America have long since come to regard as necessary to the furtherance of its best interests.

Perhaps the outstanding accomplishment of the past year was the successful organization of American participation in the London Congress. Eighteen contributions from American authors to the proceedings of this Congress portray in effective manner the existing status of technical and philosophic progress in management in this country. Apart from the extent to which Americans may have enriched the management literature of the world, it is probably well within the bounds of moderation to say that personal participation in the meetings by a representative delegation from this country contributed productively to the discussions, as well as to cognate activities. It is with some satisfaction that I may report to the Council the conviction that, with the organization of the Council and its participation in the London Congress, the influence of American points of view upon the international movement is

again being exerted in a progressively constructive manner.

Underlying the accomplishments recited, there is to be discerned in increasing measure the binding character of the inter-society relationships that constitute one of the chief objectives to which the Council stands dedicated. One may best appraise the value of these ties by contrasting current conditions with those which prevailed in the period before the organization of the Council. It may definitely be postulated that, as an agency for the maintenance of an entente cordiale among the management associations and societies in this country, the Council performs an indispensable function that will tell more and more heavily in the long run.

I have referred thus far to what I have termed "accomplishments." There is another side to the picture; namely, one that deals with problems and perplexities that may lie ahead. It is with a sense of obligation to the Council that I report upon these with the requisite degrees of candor and frankness. May I point out, first of all, the difficulties which this Council, in common with the majority of organizations of advisory character, faces in translating its deliberations into constructive action. In theory, the organization of the Council, composed as it is of three delegates and three alternates from each of the constituent associations and societies, should be equal to the maintenance of close and direct relationships with the governing boards of the member-organizations. According to the constitution and by-laws, the delegates to the Council are charged with the responsibility of providing their respective governing boards "with current information about the plans, program and proceedings of the Council and of ascertaining the official attitude of the governing boards in matters under discussion before the Council." In point of practice, practically never during the history of the Council's activities has it had the advantage of guidance from the governing boards along the lines indicated. As an interpretation of this astonishing fact, I offer the intermittent attendance of delegates at executive committee meetings, the absence of a definite procedure for ascertaining that subjects under discussion are regularly presented to governing boards, and the difficulty that the chief executives of member-organizations seem to experience in giving personal attention to inter-society relationships and allied matters.

To supply at least a partial remedy for the conditions pointed out, your chairman, from the very beginning of the activities of the Council, has imposed upon himself the duty of acting informally as quasi-liaison officer between the Council and the constituent associations and societies. It is obvious that this burden does not properly rest upon the chairman's shoulders; motivated by an understandable interest in furthering the objectives of the Council, he has done what he could to fill an existing need, even though, with the pressure constantly upon his time from other directions, he has doubtless fallen short of the standards that he would have wished to attain.

That the casual relationships maintained under the conditions pointed out leave room for misunderstandings and possible conflicts of views, is apparent. It is very much to be hoped that in the future the governing boards of the member-organizations may recognize the wisdom of being represented in the deliberations of the Council, and especially of its executive Committee, by their leading executives, so that more intimate relationships

may be established and the executives, themselves, may gain by the first-hand contacts of organized character which the Council, as the only agency of its kind in the management field, alone is able to furnish.

While addressing myself to the problems and perplexities, I should cite, next, the purely nominal extent of the financial resources of the Council. At the time of formation of the Council, it was felt, doubtless wisely, that the annual membership fee should be restricted to an amount concerning the reasonableness of which there could be no question. Starting with a membership fee of fifteen dollars for the first year, an increase to twenty dollars was effected at the second annual meeting. The total amounts collected on these two bases have fallen short of the barest legitimate requirements, with the result that your officers and others interested in the work of the Council have been compelled personally to defray expenses arising in connection with performance of their duties. It is farthest from my thought to suggest that the Council provide for an elaborate financial program. Under present conditions its only source of revenue is from member-organizations, and these, as is generally known, are concerned enough with their own operating budgets to warrant the assumption that they will not look with too sympathetic an eye upon a material increase in the cost of membership in the Council.

Now we must face, in connection with this financial problem, the obligation which the American delegation to the London Congress assumed when voting in favor of having the Council contribute its pro-rata share to the cost of maintaining the office of the Secretary-General of CIOS in Zurich. This share was determined by CIOS to be \$200, an amount exactly equal to the entire budget of the Council for 1935. May I point out that at the meeting of the Executive Committee of the Council held on December 20, 1935, it was unanimously voted to recommend to the Council that the share of the expenses of the Zurich office of CIOS allocated to the United States be met by addition of the amount in question to the annual budget of the Council. An opportunity to discuss this important problem will be afforded when the budget for this year comes up for consideration, and I earnestly hope that the Council will decide to support its London delegation and its Executive Committee in the action already taken. As of significance in this connection, it should be noted that the statutes of CIOS governing membership in the International Committee call for the payment of an annual contribution, as determined by CIOS, within three months following the date of notification of the sum due. I quote the language of the statute: "If the contribution is not liquidated within five months, the Executive Committee may strike out the defaulting member from the list of members."

Transcending in importance all other problems with which the Council is or will be faced in the near future, is that involved in the preparation and execution of plans for a successful Congress in the United States in 1938.

Early in the spring of last year, and, be it said, much to our astonishment, an informal intimation was conveyed in a letter from Prof. Limperg, then President of CIOS, that the International Committee might conclude to extend an invitation to the United States to hold the Seventh International Management Congress in this country in 1938. Coupled with this intimation was a request by Dr. Limperg for an informal

expression of views as to the desirability, from the American point of view, of holding the next Congress in this country in 1938, and as to the receptivity of the National Management Council to such an invitation, if tendered. After full discussion of the matter, the Executive Committee, at its meeting of June 11, 1935, voted unanimously to accept such an invitation. It was with corresponding instructions that the American delegation proceeded to London and, on July 18, attended in a body the full meeting of CIOS held in the late afternoon in the auditorium of the Federation of British Industries, 21 Tothill Street, London.

It is essential that a clear understanding be had of the conditions under which this full meeting took place. There had just been concluded a most successful Congress, held under the auspices of over fifty outstanding professional, scientific, academic, commercial and governmental organizations of Great Britain, led by the Federation of British Industries. England, be it noted, was not then, neither is she now, a member of the International Committee. Nor had Germany, although represented informally at the International Committee, yet concluded to affiliate with CIOS. Among matters of the first order of importance to be determined at the full meeting were the following:

1. Consideration and adoption of a completely revised and expanded set of statutes governing the activities of the International Management Committee;
2. Ways and means of placing upon a basis of organized affiliation the relationships of Great Britain and Germany to the International Committee;
3. Determination of the most effective method of organizing, on an international scale, interest and co-operation in a Congress to be held in the United States.

It would tax unduly the time available on this occasion were I to describe in detail the directions taken by discussion of these three topics both before and at the full meeting.

Suffice it to say that, on the initiative of our over-seas colleagues and with the cordial support of the American delegation, it was concluded, as the best means of effecting in course of time an organized participation by Great Britain in the international movement, to tender the presidency of CIOS to an Englishman of outstanding qualifications and position. Naturally, the first tender was made to Sir George Beharrel, past president of the Federation of British Industries, to whose untiring efforts a large part of the success of the London Congress is attributable. Unfortunately Sir George found himself compelled, under orders from his medical adviser, to decline the honor of the presidency. A tender was then made to the Rt. Hon. Viscount Leverhulme and, much to our gratification, Lord Leverhulme accepted in principle, and later confirmed his acquiescence in election to the office in question.

At the time, it was realized that any lead taken by Great Britain in the matter of affiliation with CIOS was bound to have considerable influence upon the attitude and points of view of Germany. One highly stationed Englishman went so far as to say that he thought that Great Britain would join the International Committee, that in due course of time Germany would follow suit, and that in the years to come, these two countries, in common with the United States, might well

be expected to dominate, for constructive purposes, the international management movement.

In recognition of the practical necessity of meeting such unprecedented circumstances as would be involved in holding an International Management Congress for the first time in the United States, with the broad expanse of the Atlantic Ocean separating the seat of the Congress from all the countries in which the half-dozen preceding Congresses had been held, the International Committee created the new office of Deputy-President, and conferred upon your chairman the honor of election thereto.

In the meetings of the Executive Committee which have occurred since the return of the American delegation to this country, a series of discussions germane to initial planning in connection with the next Congress have taken place. As the outgrowth of these discussions, a special committee, consisting of the present officers of the Council, was organized to explore the project in its various bearings and to consider ways and means of creating an organization comparable in type, scope and purpose to what our British cousins created, as the most effective means of assuring the success of the next Congress. In this connection, it is of vital import to recognize the necessity of planning on a scale and in a manner commensurate with solving the problem of securing an adequate participation from across the seas in any International Management Congress to be held in this country. It is one problem to organize domestic co-operation and participation on a grand scale; it is quite another, and assuredly a more difficult one, to overcome the obstacles of time and expense which face every European participant in an American congress.

As the International Committee doubtless views the matter, it will presently wish to be definitely informed of the time of year at which the Congress is to be held, the extent of the financial resources which this country will be in a position to pledge toward meeting the expenses of the Congress, the degree of representativeness of the several agencies which will be brought together to form a sound organization and an effective working body, the ability of the American organization to visualize and to create a program that will be of interest and value, not alone domestically, but also throughout the foreign countries which will be expected to send delegates to the Congress, and, finally, the character and effectiveness of the liaison between Europe and America which it may be expected to achieve in the planning of the Congress as a whole. With respect to all of these considerations, it is utterly impossible at the present moment even to indicate the lines along which organization and procedure in this country will develop. It is for this and other reasons that your officers have deemed it inadvisable to undertake essential studies until after the first meeting of the Executive Committee of CIOS has been held and an opportunity has thus been afforded for full and comprehensive discussion with our European colleagues.

Your chairman wishes to report that, in concurrence with Lord Leverhulme, he has arranged to be present in Paris at the end of this month to attend the first meeting of the Executive Committee of CIOS to be held subsequent to the London meeting. The Paris conference is scheduled for January 31 and February 1; included in its agenda will be discussions of all important matters bearing upon plans for the next Congress; determination of the scope of activities and procedures

of the office of the Secretary-General, and establishment of a basis of liaison between the two vitally necessary sets of activity to be conducted on opposite sides of the Atlantic.

Utilizing the fact of his presence in Europe, your chairman is planning to go to Berlin for a conference with the official representatives of the German government in whose hands the ultimate decision on affiliation with CIOS will lie. He would regard it as a privilege to be able to accomplish some progress in directing the attention of the German government toward the wisdom of authorizing an affiliation with CIOS.

At this point, although conscious of the fact that in what I have said I have hardly done justice to the important matters to be presented to the Council, I nevertheless deem it appropriate to conclude my report. In the three years in which I have had the privilege of serving the Council as its chairman, I have striven, with all the energy, vision and unselfishness at my command, to assist in the realization of the objectives for the achievement of which the National Management Council was organized. I cannot hope that in so dynamic a task I may always have succeeded in pleasing everyone and in meeting substantially points of view which in their formation have often partaken of a conflicting character.

There is more ahead for the management movement of this country than what we have faced in the past. The tasks confronting us are bound to tax the capabilities of even the largest and most experienced group of leaders that can be mustered for their performance. There is an over-abundance of opportunity for the display of every type of talent that can be pressed into service. I ask, with all the sincerity at my command, that you view the future in terms of a challenge which can best be met by united and co-operative endeavor, each serving where his capacity will count for the most.

This is my last report in the capacity of your chairman. I thank wholeheartedly all of you who have helped me in my work, and I express obligation especially to those who have been good enough to favor me with constructive criticism. I wish my successor a full measure of success, and I pledge him my complete support and loyalty in the difficult work which he will be called upon to perform.

(Continued from page 81)

Unfortunately there has been a lot of "hokum" and "bunk" in past practices of merchandising management and much copying and imitating of another's good work. The calling of an industrial engineer is an honorable one, and by history and precedence prescribes the practices of vision, research, ingenuity and originality. The field for sound, honest and effective work is wide, and if we look to the past, it is for example and reference only. Initiative, ingenuity and originality in solving these problems will bring prestige and profit to those with the will to explore, and will add bright pages to the book of past engineering accomplishments.

More Summaries

(Editor's Note: In the September, 1935, issue of the Bulletin of the Taylor Society and of The Society of Industrial Engineers were published some of the official abstracts of papers delivered by American participants at the Sixth International Congress for Scientific Management held in London, July 15 to 20, 1935. The two following complete the list.

Acknowledgement is made to the Management of the London Congress, to the publishers and to the authors for permission to use these summaries.)

RECENT SCIENTIFIC TECHNIQUES IN MEASURING DISTRIBUTION AND FACTORS AFFECTING DISTRIBUTION

By HENRY C. LINK, PH.D.

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and

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DURING the past few years of declining distribution in the States, scientific study has been given to problems of distribution as never before. These studies have revolved around a few basic questions: What is the consumer buying now, and why? How or where is he obtaining it? What is he likely to buy and how may he be influenced to buy certain articles?

The extensive activities which have grown out of the attempts to answer such questions have come to represent a recognized phase of business, designated as *market research*. This paper concerns itself with the description of techniques or scientific methods which have been developed, and primarily with those methods contributed by a group of about seventy-five university psychologists associated with the Psychological Corporation of New York. Among the techniques developed by this group, certain ones are described either fully or briefly, including:

The Method of Triple Associates, a scientific method for measuring the effective distribution of ideas about products (advertising).

The Psychological Sales Barometer, by which the proportionate distribution of customers or buyers of trade-marked articles in a group of products is measured every two months, the barometer being based on

groups of 4,000 families in forty-seven cities interviewed every two months.

The Measurement of Influences and Motives, a discussion of psychological techniques used in discovering why people buy and how they may be influenced.

Product Tests, consisting of the testing of new products in relation to the existing distribution of similar products.

Tables are given to illustrate the methods and results. Brief mention is also made of the market research of private companies such as Lever Brothers, and of such methods as studies of sales by sample groups of retail shops. The writers conclude: "Market research as carried on by various organizations in this country represents a notable addition to the field of scientific management, especially in respect to those aspects of management which have to do with the psychology of distribution as contrasted with the economics or mechanics of distribution."

GUIDES TO THE EFFICIENT CHOICE OF HOUSEHOLD GOODS

By HELEN W. ATWATER

Editor, Journal of Home Economics, Washington, D. C., U. S. A.

American home-makers find that efficient household purchasing is extremely difficult because it involves choices between a great variety of goods to whose values no reliable guides are available. Standards, grades, performance specifications, and other devices common in wholesale transactions are not used in retailing, and manufacturers and middlemen often seem reluctant to have them made available to ultimate consumers. Government control of consumer goods in the United States is more commonly indirect, through voluntary co-operation from industry for the elimination of unfair or uneconomic trade practices than through laws regulating quality or truthfulness of claims. Outstanding exceptions to this are the United States Pure Food Law of 1906 and regulations in the interests of health or fair trade practice. The "New Deal" is attracting attention to the rôle of the consumer as a partner in industry, and several proposed measures have aroused wide discussion of grades, standards, informative labels, and truth in advertising as means for his protection. So-called consumer education is rapidly increasing the understanding of and demand for reliable purchasing guides for consumers.

REVIEWS

Executive Guidance of Industrial Relations. By C. C. Balderston, University of Pennsylvania Press, Philadelphia, 1935, pages x, 435. (\$3.75.)

This is an unusual study in the field of industrial relations in that it presents for the first time between two covers the record of personnel activities of twenty-five companies chosen as "outstanding either for their experimental efforts or for their development of well-balanced programs." The appraisal is frankly qualitative in that the writer's standard may or may not seem valid to the reader, although this reviewer finds the criteria adopted liberal and progressive. The work will be of greater value to the teacher than to the busy executive, chiefly because of the method of presentation; although any executive could profitably ponder the chapters on a "composite program" and "an appraisal of methods and conflicting concepts."

The study does not minimize the controversial issues at stake and the discussion of "opposition versus community of interest between employer and employee," while not profoundly philosophical, at least does not claim that no problem exists.

The chief critical comment to be offered regarding such a meritorious and useful work as this is that since its data are compiled for public statement, it is likely that the published results may stress the favorable and slight the unfavorable policies and conditions found. But even discounting this natural possibility, the reader will find here an impressive record of creative achievement in a field of social scientific application which is still in its experimental infancy. By ORDWAY TEAD, Editor of economic books, Harper & Brothers, and lecturer on personnel subjects, Columbia University, New York.

Report of the National Survey of Potential Product Capacity, Works Division of the Emergency Relief Bureau, City of New York, 1935, pages xviii, 358. (\$4.00)

National Economy, viewed as a management problem, is determined by the physical plant at the disposal. Its operation, like that of an individual plant, may be full or restricted; may be efficient, or wasteful; may be planned or desultory. Likewise, its output may be consumed domestically or exported; the consumption may be immediate or gradual; may be balanced or unbalanced.

That the utilization of our productive capacity has been and is restricted is evident to anyone who would but observe. Yet the accurate inventory of idle capacity was lacking. The first estimate of such idleness was made by Wesley Mitchell and Harlow S. Person in the Columbia University Commission's report, which estimated our "excess" productive capacity at something less than 100%. The work of this Commission was more in the nature of an assay than a statistical or engineering research.

It was based upon some two hundred questionnaires freely answered by men who knew industry and its potentiality from life-long first-hand experience.

The second attempt was made by The Brookings Institution (*America's Capacity to Produce*) which arrived at a wistful conclusion on the basis of statistical examination of some half

of our industries, that even at the height of our past "prosperity" in 1929, we could have produced 19 per cent more than we did. This estimate intentionally understated productive capacity inasmuch as it restricted the definition to "practical results which could be obtained under conditions of operations with which we have had actual experience." "This," Brookings explains, "does not mean the maximum" and they set a "limit of our estimates to what would practically be attainable under conditions of sustained simultaneous operation." In plain words, it means that they tried to determine what our output would have been, were the conditions what they were. The answer logically should be: "it would have been what it was," but by a device of "simultaneity" they found 19 per cent elbow room. The mountain labored and brought forth a squeak—but the mouse was not there.

The National Survey of Potential Product Capacity approached the question from a managerial point of view in contra-distinction to other statistico-economic approaches.

The Survey postulates that the productive plant is built for production. That production can be carried full time with the exception of periods needed for overhauls, maintenance, and resettlings as production schedules demand. Thus, it clearly differentiates between the capacity to produce and the economic incentives for sabotaging full possible output. Stated in different terms, the "capacity to produce" in the sense of the N.S.P.P.C. studies is unadulterated by the extraneous considerations of "capacity to purchase" the potential output or "capacity to derive profits" by manipulating market supply. Using the language of the Report, the problem was considered as "The capacity of the existing plant if production were limited solely by the physical factors and knowledge (i.e., resources, man-power, and technology)."

These physical limitations fall into two major classes. *First* the limitations of management. Hoover's Committee Report on "Waste" some years ago emphasized the fact that industrial waste due solely to management methods is not only appalling, but also by far exceeds the waste caused by labor.

Alford and Hannum in their more recent studies of the application of K.M.H. method of analyzing manufacturing operation brought out the fact that management and technology vary in different plants so widely as to present a great difference between the groups of more productive and least productive plants in units of output per man-hour. Thus, in petroleum refining this amplitude is 1 to 224; in lumber and timber industry it is 1 to 13; in the blast furnace industry it is 1 to 9. Thus the mean and an average output capacity is somewhere between these two groups, the nearer to the top the greater was the recent investment into capital goods industry and labor-saving equipment. Consequently, this first limiting factor in determination of the product capacity (output) is quite considerable. Had the American workers and engineers the incentive similar to that offered by the Stachanov movement, the figures of the N.S.P.P.C. report would be dwarfed.

The *second* limitation is definitely imposed by the desultory, competitive nature of our industry wherein temporary or illusory opportunities in any one line of production might have led to over-equipment beyond the needs of subsequent fabrication or in excess of supply of materials or parts from the pre-

ceding stages of production. In order to avoid pitfalls of incorrect evaluation of potential output by overstating the capacity for which there is no call in the balanced concatenated flow of production, the survey undertook to check every data of potential output in consecutive stages. The Flow Chart offers an unprecedented and valuable guide in this respect and graphically depicts the excesses, deficits or increments in various fields and steps of processing—farming, extraction of minerals, first processing, manufacture of parts, assembly, construction, transportation, etc., down to consumption of producer's goods and consumer's goods by the ultimate consumer.

In this respect, while dealing with the planless situation, the study itself was organized from the aspect of planned, balanced needs of the population. In other words, as in private industry or an individual household, the activities and expenditures of various departments or for various needs are *budgeted* so that there would not be too many wheels and too few axles or too much ice cream and not enough clothing, so the Survey has accepted a certain National Budget against which the potential output of goods and services were projected. This yardstick of what a hygienic, comfortable living for 125 million American people of given sex, age and occupational distribution would require, offers a unique feature of the survey.

Confronted with the task so conceived and of such stupendous magnitude, the staff of the Survey did not shrink before this "attempt to state productive capacity in terms of loaves of bread, pounds of beefsteak, pairs of shoes, suits of clothes . . . houses . . . talking pictures, radios, prize-fights, sermons and permanent waves" as The Brookings Institution did, merely because it "presents obvious statistical difficulties" (America's Capacity to Produce, page 22).

To be specific, let us envisage the conclusions reached by the Survey, using the items jocularly enumerated by Brookings as presenting "obvious statistical difficulties."

Item	Quantities in 1,000 pounds		
	Production 1929	Capacity	Budget
Flour	15,683,878	24,412,346	5,175,680
Bread	14,019,000	19,150,000	4,626,270
Biscuits	1,394,000	3,220,000	460,000
Meat	15,514,200	30,650,408	17,000,000
Shoes (all) pairs ...	361,400	550,000	394,250
Suits (Men's) pcs. .	29,090	79,110	67,000
Dresses			
(Women's) pcs. . .	206,460	470,728	275,250
Houses—value	\$2,252,000	ind.	\$9,000,000
Electric current			
domestic	9,773,000	12,221,625	12,221,197 K.W.H.
Cement (bbls.)	172,856	271,308	
Glass M. sq. ft.	402,559	1,200,000	
All contests	\$ 220,545	600,000	600,000
Radio and parts	\$ 633,034	1,899,102	1,000,000
Beds in hospitals 1930	956	ind.	1,422
Etc.			

An engineering analysis of the situation, as disclosed in the Survey calls for definite answers to the three following questions, in the order given:

1. Are we distributing our products and services so as to satisfy all existing wants and needs in all economic strata of our society. If not, why not?
2. Are our productive means sufficient to secure an adequate standard of living for all? If not, what means are inadequate?

3. Is our population productively engaged in providing goods and services needed? If not, why not?

The correct answers to these queries have been sensed for some time past, as is evidenced by such current expressions as "economy of abundance," "economy of scarcity," "paradox of want amid plenty," etc. Now, with the publication of the Report on the Survey of Potential Product Capacity, a definite quantitative answer is given. There might still be room for corrections, extensions and amplifications as time hammers out changes in our economic pattern, but Professor Charles A. Beard was amply justified by referring to the volume as one of the most significant books of the Twentieth Century.

In the final collation the comparisons are made in three terms of expression—output, capacity and budget requirements. These are given in quantities as well as in 1929 dollars, but at no time was the dollar accepted as a financial device or "symbolic money," but as a frame of reference for expressing the relative incongruity between the "demand" (1929), limited by the inadequate purchasing power, the capacity to meet an 80 per cent higher "demand" and the real requirements if a decent standard of living is to be enjoyed by all American people.

The Brookings' "America's Capacity to Consume" arrived at the conclusion that "to reach these standards would require an increase in the production of all kinds of consumers' goods and services by something like 70 or 80 per cent." (Vol. II, page 124.)

The N.S.P.P.C. research, as previously shown, demonstrates the physical ability to meet a balanced budget of \$135,000,000,000 annual national income as contrasted with some 81 billion dollars of unduplicated income in 1929, or two-thirds higher. This means some \$4,400 per family as contrasted with hardly one-quarter of that income which is an average lot of an American family.

The three basic questions of our inquiry at last can be answered:

1. We do not meet the needs and wants of all strata of our economic society. We do not meet it because of the lingering tradition of creating artificial scarcity to maintain high level of prices.

2. Our productive means are adequate to provide a liberal standard of living to all. There are, however, certain shortages such as in milk production, in hospitalization, in education, etc., but their amelioration presents no practical difficulties with the available labor and resources.

3. Our population is not fully engaged in production of the needed goods and services. The cause again is the artificial maintenance of scarcity.

To sum up, the new technique of power production¹ as developed in the competitive society can no longer be fully utilized, due to the internal contradictions above mentioned. New economic and social relations are therefore forced upon us by the development of technology and productive methods. These, however, are still used not to produce goods but to harvest dollars, and if more dollars can be diverted by not producing goods the plants and men are forced to idle under existing economic conditions and we are observing the paradox of growing one blade of grass where four should grow, and

two grew before. By WALTER N. POLAKOV, Works Progress Administration, Washington, D. C.

Ford Production Methods. By Hartley W. Barclay, Harper and Brothers Publishers, New York, 1936, pages ix, 219. (\$5.00)

This book by the editor of *Mill and Factory* represents a unique contribution to the literature of management and engineering. A vast body of information on production methods, processing, engineering and technical procedure, and human relations in the Ford Motor Company is made available to the public for the first time. Such a book is obviously significant to all industrialists, be they at the top or at the bottom, teacher or student. The publication is a veritable textbook on the most advanced production policies and methods.

A new trend in the Ford policy of production is the tendency toward decentralization. Henry Ford has actually been moving important units of his automobile production plant into the country. More important, however, is the fact that in doing so he has made small-plant production achieve new standards of efficiency. A great many of these small plants are completely air conditioned. Valves, small tools, gages, etc., are manufactured in these units. They exemplify Ford's ideal to raise standards of living.

Among Ford's gigantic programs of this era is the modernization project; e.g., there is the 1,400 pound, 900 degree F., 110,000 kilowatt turbo-generator power plant; a new hot strip and cold finishing steel mill, two new coke oven batteries, gas and propane holder and distribution lines have been constructed. Over 60,000 motors have been changed from DC to AC; air conditioning has been added to the molding room in the foundry.

The book has excellent cuts; the tables and charts are complete. Process-flow charts are given for the major operations. The floor plans of the Dearborn plant and English and German plants show the application of Ford plant equipment lay-out methods.

The safety program, buildings, inspection, welding, materials handling, power and mechanical power transmission, small tools, machine tools and accessories, abrasives and grinding equipment, and lighting and electrical apparatus relative to the Ford plants are treated in detail.

Barclay's execution is of unusual calibre. The book is an outstanding contribution to the management and engineering fields. It is worthy of not only the consideration but the study of any individual in these fields. By E. DILLON SMITH, Pratt Institute, Brooklyn, N. Y.

(Continued from page 77)

initiative both in practical work during vacations and in the choice of subjects studied.

We have records of members on hand and shall be glad to select and refer to you those with the right qualifications for the position you have. There is no charge for our service.

¹ See "The Power Age" by Walter N. Polakov, Covici-Friede, N. Y.

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